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ABSTRACT

A study was conducted to examine syntactical development in spontaneous written language of selected preschool, kindergarten and first grade children. The two major experimental questions were: (1) Will there be development towards greater complexity in the syntax of spontaneous writing and how should it be described? (2) What transformational linguistic analysis of spontaneous writing at the acquisition and early development stages tell about the ability to express syntactical relationships in writing? Spontaneous written language in response to a stimulus picture was obtained weekly from 5 children each at three grade levels (8 boys and 7 girls, ages 4-7) over a ten week period. Each child was tested individually. A case study approach was used to analyze each written corpus. A battery of tests for background data, letter recognition, letter writing, word writing, oral reading, vocabulary and drawing was administered. Results revealed parallels between acquisition and early development in oral and written language, ability to produce linguistic forms and to express syntactical relationships, and increasing movement towards complexity in spontaneous writing. Each child's written language corpus is included. Appendices contain relevant statistical data. (CLK)

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A TRANSFORMATIONAL LINGUISTIC ANALYSIS OF SYNTACTICAL STRUCTURES IN THE WRITTEN LANGUAGE OF SELECTED PRESCHOOL, KINDERGARTEN, AND FIRST GRADE CHILDREN: FIFTEEN CASE STUDIES

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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CHAPTER I

INTRODUCTION

Introduction to Transformational Linguistic Theory

A transformational grammar is a description of the system of rules underlying a language (Liles, 1971, p. 7). The concern of the transformational grammarian is to find out what rules a speaker/writer knows about his language (his linguistic competency) through the speaker/writer's application of these rules (his linguistic performance) (Chomsky, 1966, p. 91). A transformational grammar has a threefold function: (1) to account for the structural relationships expressed in an utterance (syntax); (2) to account for the meaning of these structures through the lexical features (semantics); and (3) to account for the pronunciation rules through an identification of speech sounds and how they are used (phonology) (Menyuk, 1971, p. xiii).

Application of Transformational Linguistic Theory to Oral and Written Language

Linguistic performance can be examined through an analysis of either oral or written language. Recent attempts to describe the structure of language through a transformational grammar approach (Chomsky, 1957, 1965, 1966) have prompted a surge of interest in describing the acquisition and early development of oral language (Menyuk, 1971, p. xiii). Since 1960, most studies on written language, as well, have been influenced by transformational grammar approaches (O'Donnell, et al., 1967, p. 4).

Several recent studies on written language have attempted to provide workable systems for the examination of syntactic development, syntactic complexity, and/or syntactic deviations in populations of varying ages and kinds.[1] These systems would appear to adhere to Chomsky's definition of "grammaticality," where primary emphasis is on an accurate description of the interrelationships among words, rather than a descriptive labelling of individual words (Chomsky, 1965, p. 5; Kretschmer, 1972, p. 13).

However, these recent attempts to examine children's written language from a transformational approach have focused on the writing of children whose written language is said to be somewhat established, i.e., third grade and beyond (Hunt, 1965, p. 2). Studies have shown that first and second graders can write spontaneous compositions (Parke, 1959; Schwartz, 1970). Furthermore, some preschoolers and kindergarteners would appear to be able to make written productions, based on abstract inferences they have about the sound system of their language which enable them to invent their own spelling systems (Read, 1971).

To date, no models exist for the study of the syntactical structures of children's early written language. However, as has been pointed out, research on the acquisition and early development of oral language has proliferated in the past few years (Menyuk, 1971,

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[1] Portions of the analysis systems of Hunt (1965, 1966, 1970), O'Donnell, et al. (1967), and Kretschmer (1972) will be reviewed in Chapter Two.

p. xiii). It would appear, then, that an examination of the grammar of written language of preschool and early primary grade children might provide bases for comparison with existing studies on syntax development, both oral and written.

Statement of the Problem

The purpose of this project was to examine syntactical development in the spontaneous written language of selected preschool, kindergarten, and first grade children.

Experimental Questions

Experimental questions were as follows:

(1) Will there be development toward greater complexity in the syntax of preschool, kindergarten, and first grade children's spontaneous writing? If so, how can this development be described?

(a) Will categorization of spontaneous writing into developmental stages, adapted from existing descriptions of oral and written language acquisition and development reveal development toward greater complexity?

(b) Will an assessment of T-unit factors, as described by Hunt (1965) and O'Donnell, et al. (1967), reveal development toward greater complexity?

(2) What does a transformational linguistic analysis of children's spontaneous writing at the acquisition and early development stages tell us about their ability to express syntactical relationships in their writing?

(a) What presentence structures do children exhibit in their spontaneous writing?

(b) What syntactical relationships do children using presentence structures exhibit in their spontaneous writing?

(c) What basic sentence patterns (kernel sentences) do children using sentences exhibit in their spontaneous writing?

(d) What transformations do children using sentences exhibit in their spontaneous writing?

Delimitations

The use of pictures as stimuli may have limited composition length and nature of response, particularly among the first graders. Because a case study approach was used, the number of children at each age level was necessarily small. Findings of this investigation therefore must be seen as highly tentative. Because of the small number of cases, no statistical treatment of the data was employed. As thirteen of the fifteen children in this study attended a private school in Cincinnati, Ohio, the population was defined, socioeconomically and geographically.

Definition of Terms

Basic sentence patterns, or kernel sentences, refer to five simple sentence types without expansions and are identified in the Linguistic Analysis Worksheet, Appendix A.

First grade population in this study included five children, ages 6.2 - 7.2, four of whom attended a private school in Cincinnati, Ohio, and one of whom attended a Cincinnati public school.

Kindergarten population in this study included five children, ages 5.8 - 6.7, four of whom attended a private school in Cincinnati, and one of whom attended a Cincinnati public school.

Preschool population in this study included five children, ages 5.7 - 5.6, who attended a private school in Cincinnati, Ohio.

Presentence structures refer to graphic symbols having no identifiable morphemes or one or more identifiable morphemes involving portions of a noun phrase or verb phrase, but not both.

Spontaneous writing is defined as graphic symbols recorded by the child in response to a stimulus picture.

Syntactic complexity refers to number and types of syntactical relationships within presentence and/or sentence structures. In this investigation syntactic complexity was measured in two ways: (a) by categorizing written language into developmental stages; and (b) by assessing T-unit factors. (For further examination of measures of syntactic complexity, see Identification of Terms Used in Analysis of Data, Chapter III.

Transformational linguistic analysis refers to a system for analyzing written syntax by an examination of basic sentence patterns and the kinds and number of operations on these basic sentences. (See Appendix A and Identification of Terms Used in

Analysis of Data, Chapter III.

Transformations refer to the kinds of operations occurring on a sentence. For purposes of this investigation, these operations included kernel sentence expansions, defined as auxiliary, adverbial, or determiner expansions on the basic sentence pattern; simple transformations, defined as further alterations within one kernel sentence through the substitution, deletion, or rearrangement of elements; and complex transformations, defined as the combining of two or more basic sentences into one T-unit through the substitution, deletion, or rearrangement of elements. (See Appendix A and Definition of Terms Used in Analysis of Data, Chapter III.)

T-unit is a term coined by Hunt (1965) to refer to a main clause plus all of its subordinate clauses. As children sometimes omit capital letters and end punctuation in their writing, the T-unit, rather than the sentence, was seen to be an appropriate unit of syntactical measurement.

T-unit factors refer to those elements of the T-unit that help to determine its length and complexity. These elements involve the following formula, devised by Hunt (1965): average length of clauses x ratio of clauses per T-unit = average T-unit length. An additional complexity factor used in this investigation was number and percentage of T-units less than 9 words in length. (For further explanation of terms, see Definition of Terms Used in Analysis of Data, Chapter III.

CHAPTER II

REVIEW OF THE LITERATURE

In order to examine written language performance in the acquisition and early development stages, it was necessary first to establish the feasibility of obtaining spontaneous written language from preschool, kindergarten, and first grade children, as little research on the writing of young children exists. Next, literature on oral language acquisition and development was examined in order to determine possible relationships between oral and written language acquisition. Thirdly, an examination of literature on written language development in older children was undertaken to provide comparisons with findings of this investigation. Primary emphasis was on literature which discussed language from a rule-based framework, where performance is examined to reveal information about understanding of the abstract rules governing that performance (Smith, 1973, Chapter 1).

Feasibility of Obtaining Written Language Production from Preschool, Kindergarten, and First Grade Children

To date, no models exist for the study of children's early written syntax. Yet, a few studies of preschool and first grade written language appear to indicate that young children can produce spontaneous written language, if given the opportunity to do so.

Preschool and Kindergarten Studies

Children in our culture learn to perceive letters as different from non-graphic symbols long before they learn to read (Lavine,

1973). Wheeler (1972) demonstrated that kindergarten children readily learn to print letters and letter combinations. That preschool and kindergarten children can produce real words and real word combinations was demonstrated by Read (1971), who examined the phoneme-grapheme relationships of three, four, and five year old children's written language. Read suggests that children invent their own phonological rules and that they can make abstract inferences about the sound system of their language before learning to read and write (p. 32). The children in his study were early spellers and, in some cases, early readers, but they were not exceptional (p. 31). Their commonality lay in the similarity of instructional techniques by preschool teachers and their parents: a " ... willingness to accept the child's own spelling efforts, to provide simple materials (first blocks and other elementary alphabet toys, then paper and pencil), and to answer questions" (p. 31).

Early Primary Grade Studies

Some researchers would argue for teaching writing as the last step in a hierarchical progression of language development, beginning with activities involving listening, talking, reading, and finally, writing. In this view writing is considered to be the most complex of the language processes and therefore the last to be tackled.[2] Others, however, question this assumption. Parke

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[2] For a review of literature on teaching children to express their thoughts in writing, see Parke (1959) and Burrows (1966).

(1959), for example, suggests that in the early stages writing and reading are not significantly related and that there is a need for further experimentation on ways of introducing primary children to the language media (p. 116). Literature on i.t.a. supports Parke's assumption (The Initial Teaching Alphabet Foundation, 1966). Schwartz (1970) found that the type of instructional program in the first grade influences spontaneous written language production. Children trained in i.t.a produced more language and a greater variety of words than children in either of two other approaches.

Conclusions

The studies cited above illustrate the feasibility of obtaining spontaneous written language from at least some preschool, kindergarten, and first grade children. Furthermore, they suggest that method of approach may affect output, even in the very early stages.

Oral Models of Language Acquisition and Development

Though it would appear to be feasible to obtain spontaneous written language from young children, literature on the acquisition of written language, particularly in regard to syntax development, is virtually non-existent. Descriptions of oral language acquisition and development, however, abound in the literature (Menyuk, 1971, p. xiii). It was felt that an examination of emerging oral language might provide some basis for comparison with emerging written language, particularly in regard to the rules the child learns and the developmental stages he goes through in acquiring these rules.

Rules to be Learned

In learning his language, the child must go through the process of internalizing the syntactic, semantic, and phonological rules of his language (Menyuk, 1971, p. xiii). By the time the child is four, he is said to be, functionally, an adult speaker, in that he uses all of the sentence types of the adult speaker (Menyuk, 1971, p. 5). The child, thus, brings to the writing and reading process a well-formed grammar -- a theory of many of the regularities underlying his speech. What, then, are some of the specific rules he must learn? Menyuk (1971) lists a number of aspects of his language which the child learns during this developmental period:

> He must learn the functional relationships expressed in the sentences of his language and the classes in his language which carry out the task of expressing these functional relationships .... He must learn the difference between grammatical and nongrammatical sentences .... He must learn what are sentence paraphrases .... He must define the classes in his language in terms of the roles they play in sentences. He must understand that noun phrases can be subjects or objects in sentences and that verb phrases are predicates of sentences. He must learn that noun phrases may be composed of determiner + noun and verb phrases may be composed of verb + noun .... He must learn what are grammatical markers of gender, case, tense, person, and number in his language and learn to apply them appropriately. He must learn the properties of speech sounds in his language .... Underlying this performance is obviously the capacity to segment the stream of speech into the units sentence, phrase, word, and speech sound. In summary, the child must learn the syntactic, semantic, and phonological rules of his language (p. 16).

Developmental Stages in the Acquisition of Syntax

Bloom (1970), Brown (1973), Menyuk (1971), and others suggest that a child goes through specific developmental changes in his acquisition and development of language. In the acquisition of oral language, three stages were identified: (1) babbling and jargon; (2) one word utterance; and (3) two and three word utterance.

(1) Babbling and jargon. The role that pre-babbling, babbling, and cooing play in the development of language is largely speculative, mainly because no one has described adequately the infant's performance during this period (Menyuk, 1971, pp. 54-5). At around nine months of age, however, the young child begins to produce sounds having marked intonation and stress but containing no identifiable morphemes. Some researchers call this the "jargon" period (Menyuk, 1971, p. 5).

(2) One word utterance. Following the "jargon" period the young child begins to produce words. However, though they may have specific meaning to the child, these first words are often nonlexical items.

Between 12 and 18 months the child begins to produce a small number of words and to respond to the utterances of others (Menyuk, 1971, p. 6). The child's single word utterances have stress and intonational markers and give the appearance of being sentence-like words. Bloom (1970) suggests, however, that " ... the child has named the one aspect of the referent that has the greatest salience

for him -- an object he wants or recognizes" (p. 10). Bloom suggests, further, that children sometimes recognize more than one aspect of the referent without appearing to express a syntactical relationship between the two. For example, though one of the children in her study, Gia, said "button" and then "pocket," and even went through the motions of placing the button in her pocket, she could not seem to put the two words together in order to express their relationship. Bloom infers that there is no evidence that Gia knows the syntax but that there is evidence that she cannot use the syntax (p. 12). Menyuk also cites evidence to indicate that children producing primarily one word utterances appear to tune into the word with which they are most familiar and to disregard the others. Children producing mainly two word utterances, however, appear to attune to the structure of the utterance (p. 97). Menyuk suggests that " ... there may be stages of development during which comprehension precedes production and others during which comprehension and production are closely tied" (p. 98).

Menyuk (1971) draws these tentative conclusions about the single word utterance: (1) the child's single word utterances do not belong to any single grammatical class; (2) they are not functionally used to name objects; (rather, the child " ... uses prosodic features generatively to produce various sentence types ..." (p. 62); (3) they may be real words or inventions of the child; and (4) there may be long babbled utterances containing no recognizable lexical items but having stress and intonation, as well as

recognizable lexical items (p. 95). Throughout all of the developmental stages there is " ... overlapping or simultaneous use of structures used previously..." (p. 95).

(3) Two and three word utterances. (Roughly) between 18 and 27 months the child progresses from producing single words to producing two and three word phrases. Longitudinal studies of language acquisition demonstrate that the earliest two word utterances appear to be systematic and rule-governed (Bloom, 1970, p. 4, 222). Brown (1973) suggests that at this stage the child is learning primarily (a) syntactic relations; (b) word order; and (c) semantic roles (p. 32). Simple co-joining of elements to generate different types of sentences, such as negative, imperative, interrogative, and declarative, also are acquired at this time.

(a) Syntactic relations. According to Bloom (1970), when the child moves from single, separate utterances to two word connected utterances, he appears to be understanding underlying relationships. She bases this assumption on an investigation of the semantic intent of the utterances in her case studies of three children at this stage of development. She found, for example, that in N+N constructions, though the surface structure might indicate that the child was simply connecting two objects, the semantic intent was clearly one of agent-object, action-object, possession, etc. For example, a child who said, "Mommy shoe" in several different instances could have meant "mommy's shoe," "mommy, put on my shoe," "mommy has my shoe," etc.

Significant at this stage is the fact that the child does not use tense or inflectional markers (Brown, 1973). These developments occur only after the child has grasped the "base structure rules" of his language, i.e., an understanding of subject-predicate relationships, noun phrases and verb phrases (Menyuk, 1971, p. 126, 135).

(b) Word order. Bloom (1970) suggests that the child's learning of word order generally proceeds from right to left. For example, he doesn't say "dog that" or "want that coat me." Apparently, he learns very early that determiners precede nouns and that subjects precede predicates in declarative sentences. This ordering, according to Menyuk (1971), is not directly imitative of adult language. Rather, the child is learning what appears to be a universal development — the order rules of his language (p. 104).

(c) Semantic roles. In addition to learning syntactic relations and word order, the child is learning the selectional restrictions based on the semantic and syntactical properties of his language. For example, he is learning that "mommy ... happy" but not "hair ... happy" and that "big" precedes "box" but "big" does not precede "ask."

Development of Syntax

Factors affecting expansion of base structure rules. Once the child has learned to express the relationship of subject to predicate and can produce declarative, imperative, negative, and

interrogative sentences (generally by two to two and one-half years of age, according to Menyuk), he begins to expand his language. These expansions involve learning morphological rules of tense, possession, number, and other grammatical markers, as well as transformational operations on the base structures. Recent studies indicate that there is a hierarchical ordering in the learning of expansion rules (Brown, 1973; Menyuk, 1971). The developmental order in which the child learns to make these transformational operations, which involve addition, deletion, substitution, and permutation of elements (Menyuk, 1971, p. 126), appears to depend on these several factors: (1) "the function of particular structures; (2) the number of rules needed to derive the structures; (3) the types of operations needed to derive the structures; and (4) the selectional restrictions which must be observed in the derivation of these structures" (Menyuk, 1971, p. 159(.

(1) The function of particular structures. The sequence of acquisition of particular structures appears to depend, in part, upon the functional relationships expressed between structures. Modifiers of noun phrases, such as adjective+noun and possessive+ noun, are early acquisitions even though they involve two underlying sentence strings. Early infinitivial structures, such as "I gotta go," or "I wanna do ..." are two other functional but complex structures which appear early, apparently because of their functional usefulness (Menyuk, 1971, p. 142).

(2) Number of rules. Generally, the number of rules required to generate a structure affects the sequence of acquisition of that structure (Menyuk, 1971, p. 159). Complex transformations, which involve operations on two or more underlying sentences, are more difficult to generate than simple transformations, which operate on one underlying sentence. Thus, negative-question transformations are more difficult to generate than negative transformations. Menyuk (1964) in her study of the development of transformational rules in three to seven year old children notes that the number of children using structures which operate on two or more underlying strings increased from 47% at 3.0 years of age to 77% at 6.5 years of age.

(3) Types of operations. Menyuk (1971) suggests that there appears to be a sequence of development in the types of operations used, i.e., conjoining, embedding, deletion, and permutation.[3] The development of the "wh" question form illustrates this process. In the first step the "wh" question is conjoined to the element within the sentence (Where daddy); it is then embedded (Where daddy goes); finally, permutation occurs (Where did daddy go) (p. 139). Menyuk suggests, also, that though permutation is used by some three year old children, it is not used by all six year olds (p. 140). The operations, then, are used by some children at all of the ages described but, in general, older children more frequently use

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[3] See Chapter Five of Menyuk (1971) for an explanation of these terms.

more sophisticated operations. That children produce certain structures does not necessarily imply that they understand the underlying relationships. Furthermore, productions of one kind of operation do not necessarily reflect the child's competence in performing that operation (p. 140).

(4) Selectional restrictions. The child must learn to observe certain selectional restrictions in the semantic and syntactic properties of his language. Menyuk suggests that the child first omits classes, then substitutes among members of a class, then uses a class redundantly, and finally observes the correct selectional restrictions. An example of this development is a child's learning of the selectional restrictions of the locative preposition "to." First the child might say, "I go New York;" then "I go at New York;" then simultaneously "I go at New York" and "I go to Maine;" and, finally, use that locative preposition correctly most of the time. Children at six and seven years of age are still acquiring the base structure context sensitive rules of their language. Types of errors children make and the manner in which they make and correct them appear to depend on the class of the word and the individual's stage of development (Menyuk, 1971, pp. 137-8).

The six year old's command of syntactical structures. Until recently it was assumed that by the age of five the child has mastered the syntax of his language (Chomsky, 1969; Smith & Miller, 1966, pp. 102-3). Carol Chomsky points out, however, that " ... work in generative grammar over the last decade has considerably extended our knowledge of the depth and nature of the complexities

of grammatical structure and has given rise to the suspicion that that child of five or six may still not have mastered certain -- perhaps surprisingly many -- aspects of the structure of his language that the mature speaker takes for granted and commands quite naturally" (p. 4). That the child entering school is still developing and improving upon his syntax has been demonstrated in a number of studies on oral language development in school age children.[4]

In her study of syntactic understanding in 40 children ranging from kindergarten through fourth grade, Chomsky (1969) found that maturation plays an important role in the learning of ask-tell distinction, use of "promise," and understanding of "easy to see" vs. "eager to see." She suggests that in order to use a word correctly, the child must know both the concept attached to the word (semantic understanding) and the "constructions into which the word can enter" (syntactic understanding). In addition to maturation, however, there would appear to be strong evidence for individual differences in rate of acquisition, as some of her children used these forms correctly (or incorrectly) throughout the age range studied.

Loban (1963), in his study of language development in over 200 children from kindergarten through sixth grade, found that his youngest groups used all of the basic structural patterns of English

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[4] See, for example, Chomsky (1969), Menyuk (1969), Loban (1963), and O'Donnell, et al. (1967).

but that dexterity of use of elements within these structural patterns varied. O'Donnell, et al. (1967) made similar findings. Both investigators concluded that among school age children it is " ... not pattern but what is done to achieve flexibility within the pattern (that) proves to be a measure of effectiveness and control of language (Loban, 1963, p. 84; O'Donnell, et al., 1967, p. 89).

Conclusions

From the preceding descriptions of oral language acquisition and development it would appear that preschool, kindergarten, and first grade children have a well developed, though incomplete, concept of the rules of their language. Furthermore, this understanding would appear to reflect growth toward increasing language complexity. How young children make use of their understanding of oral syntax in their early spontaneous writing has not been determined. However, current models exist for the description of syntactical development in older children, and these will be described at this time.

Written Models of Language Development

Several recent studies of spontaneous written language using a transformational linguistic approach have provided what their authors consider workable systems for analyzing certain syntactic productions and/or assessing written language maturity. Hunt's (1965) study examined syntactical development in the written language of fourth, eighth, and twelfth graders and adult models. O'Donnell,

et al. (1967) replicated Hunt's study with third, fifth, and seventh graders and made comparisons of written and oral language of children in grades kindergarten through seventh. Kretschmer, using an adaptation of Menyuk's (1964) analysis system, described the written syntax of hearing impaired adolescents and compared syntactical structures and deviations with a matched group of normally hearing students.

The purpose of this investigation, however, was to examine emerging syntactic structures. Adaptations from these analysis systems, therefore, were made to suit this author's purposes. Two aspects of syntax were reviewed: (1) the T-unit as a viable unit for measuring language maturity; (2) a transformational analysis of the T-unit through an examination of findings on (a) kernel sentences; (b) simple transformations; and (c) complex transformations.

T-Unit as Measure of Language Maturity

Both Hunt (1965) and O'Donnell, et al. (1967) found the T-unit (minimal terminal unit) to be a viable means of measuring linguistic maturity and a more accurate measure than previously used predictors. The term "T-unit," referring to a main clause plus all of its subordinate clauses, was first used by Hunt and tested against three more traditional methods of assessing language maturity: sentence length, mean clause length, and subordination ratio (number of

subordinate clauses to all clauses).[6,7] When all four indices were tested statistically, T-unit length was found to be the best indicator of a student's grade level, clause length second, subordination ratio third, and sentence length poorest (Hunt, 1965, p. 23). Hunt suggests that "as a potential index of maturity, the unit has the advantage of preserving all the subordination achieved by a student, and all of his coordination between words and phrases and subordinate clauses" (p. 21).

Mean length of T-units. In his study of a 1000 word spontaneous writing sample from 18 children each in the 4th, 8th, and 12th grades, Hunt (1965) found that mean T-unit length increased from 60% (8.6 words at grade 4) to 80% (11.5 words at grade 8) to 100% (14.4 words at grade 12), using grade 12 as 100% achievement (p. 23).

T-units shorter than nine words. Both Hunt (1965) and O'Donnell, et al. (1967) found that younger students produce significantly more "short" T-units than older students. In Hunt's study 43% of fourth graders' words were expressed in T-units shorter than nine words, compared with 21% of eighth graders' words and 10% of twelfth graders' words (p. 29). O'Donnell, et al. (1967) supported Hunt's findings and made comparisons with T-unit length in speech, as well. He found that proportion of T-units less than nine words

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[6] For a review of literature using mean sentence length, mean clause length, and subordination ratio as measures of language maturity, see Harrell (1967) and McCarthy (1954).

[7] For a description of Hunt's rationale for establishing the T-unit as an objective and reliable indicator of syntactic maturity, see Chapter 3 of Hunt (1965). See also O'Donnell, et al. (1967), pp. 97-9.

in length was higher in third grade writing than in first grade speech. Yet, the decrease in proportion of T-units less than nine words in fifth grade writing was more marked than decreases in speech in any of the four year time spans studied (p. 48). O'Donnell, et al. (1967) concluded that syntactic control of third grade writing is weaker than speech, but that upper grades demonstrate mastery in both speech and writing (p. 48).

Mean clause length. In his examination of clause length, Hunt found that average length of clauses for fourth graders was 6.6 words, eighth graders 8.1 words, and twelfth graders, 8.6 words (77%, 94%, 100%), thus showing a significant increase among grades, particularly between fourth and eighth grades (p. 15).

Ratio of clauses per T-unit. In an examination of distribution of clauses among T-units, Hunt found that fourth graders strongly prefer to write single clause T-units, whereas about half of eighth graders' clauses are one clause T-units, and about one-third of twelfth grade T-units are one clause T-units.

Summary of Findings on T-Unit

Hunt's and O'Donnell, et al.'s findings demonstrate than an examination of T-unit factors, which involves computing average length of clauses, ratio of clauses per T-unit, and average length of T-unit, is useful in describing sentence complexity. These factors indicate whether or not T-unit length is increased by longer clauses or by subordination of clauses. Their findings indicate that younger children produce both shorter clauses and less

subordination than older children. Further, an examination of percentage of T-units shorter than 9 words appears to provide an additional assessment of syntactic development, according to their studies.

Transformational Analysis of the T-Unit

In a transformational linguistic model there are three levels of analysis: (1) the phrase structure level (kernel sentences); (2) the transformational level (simple and complex transformations); and (3) the morphophonemic level (suffixes, prefixes, word endings) (Kretschmer, 1972). In this investigation, kernel sentences, simple transformations, and sentence-combining transformations were examined. Morphophonemic restrictions on each child's corpus were noted but not discussed.

Kernel sentences. Streng (1972) defines a basic sentence as " ... one which is active, declarative, positive, and simple" (p. 19). Structurally, kernel sentences consist of a noun phrase (or subject) and a verb phrase (or predicate) (Kretschmer, 1972, p. 36). Five kernel sentence types were identified in the literature: NP+tense+be+NP; NP+tense+be+adv.; NP+tense+be+adj.; NP+V_i; NP+V_t+NP (Liles, 1971, p. 15; Streng, 1972, Appendix C).

O'Donnell, et al. (1967) identified 11 grammatically complete basic structure patterns of main clauses used by kindergarten through seventh grade children. However, these 11 patterns include what this investigator identified as "simple transformations." Furthermore, both Hunt and O'Donnell, et al. examined these patterns

in all main clauses, whereas it was considered feasible by this investigator to make type distinctions between kernel sentences, simple transformations, and complex transformations in order to examine possible development toward greater complexity.

Hunt (1965) found only minor differences in the phrase structure rules used by children in his study. He concluded that " ... the fourth grader uses virtually all the phrase structure rules which produce what some grammarians have called the 'basic sentence patterns,' and that further study of them would not be generally revealing for school children in the middle and older grades" (pp. 7-8). O'Donnell, et al. (1967) found that all patterns occurred at least occasionally but that two patterns predominated in both the writing and speech of the children: NP+V_i and NP+V_t+NP. Less than 10% of T-units contained the be+NP or be+adj. patterns, according to O'Donnell, et al. (p. 74). Of the latter two forms, kindergarten children tended to use the NP+be+NP form "proportionately more often than did any of the more advanced groups" (p. 75).

Hunt (1965) in his examination of auxiliary expansions found that with increasing age the verb auxiliary becomes more complicated, particularly in the frequency of modal auxiliaries, perfect tenses with have and in passives (pp. 122-3).

Kretschmer (1972) in his investigation of kernel sentence production in hearing-impaired and normally hearing adolescents found that the hearing impaired children produced significantly

more kernel sentences and proportionately more errors at the phrase structure level. These findings suggest to this investigator that there is a possible "complexity hierarchy" among kernel sentences, sentences containing simple transformations, and sentences containing complex transformations and that an understanding of basic phrase structure precedes sentence expansions. Kretschmer, however, pointed out that in oral language development " ... normally hearing children develop phrase structure rules and transformational rules simultaneously particularly after the establishment of the more basic of phrase structure rules, e.g., the dicotomy between noun phrase and verb phrase ..." (p. 189).

Simple transformations. Simple transformations were defined as alterations within one kernel sentence through the addition, substitution, or movement of elements.

Kretschmer (1972) found that hearing impaired subjects produce more simple transformations than normally hearing subjects (p. 62). The most frequently used simple transformations by both groups were possessive and the auxiliary verb "to be" (pp. 78-9).[8]

Complex transformations. Complex transformations involve the combining of two or more kernel sentences and are formed by the processes of substitution, deletion, addition, or rearrangement of elements (Liles, 1971, p. 51). O'Donnell, et al. (1967) found

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[8] In this study aux expansions were considered part of the base structure rules and were treated as a category of kernel sentence expansions. (See Appendix A.)

that total number of sentence-combining transformations increases with age. Kretschmer (1972) found that normally hearing students produce significantly more complex transformations than hearing impaired. Number, however, does not necessarily reveal much about the complexity of the transformations (O'Donnell, et al., 1967, p. 50). An examination of the most commonly used sentence-combining transformations discussed in the literature was made. These transformations included (1) nominal, (2) infinitive, (3) subordinate clause, and (4) coordinate structures.

(1) Nominal expansions. Nominal expansions were defined as operations on the noun phrase, excluding clauses and determiners.[9,10] Modifiers of nouns lengthen clauses and thus help to explain T-unit expansion.

Hunt (1965) found that younger students use more unmodified nominals than older students and, of these unmodified nominals, they use more pronouns than nouns. He suggests that " (these) ... children tend to express themselves in short clauses and so need to carry the same noun reference from clause to clause, using pronouns for that purpose" (p. 100). The noun modifiers used most commonly

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[9] This definition differs from Streng (1972), who defines nominalization as "that characteristic allowing for the creation of nouns from other form classes ..." (p. 189).

[10] See Hunt (1965), Chapter 7, for a further discussion of nominals.

by all grades in Hunt's study were adjectives. Second in order were genitives (possessive nouns and pronouns).[11] O'Donnell, et al. (1967) found that genitives occurred most frequently, noun adjuncts (N+N, as in mailman) second, and adjectives third (p. 60). Both investigators suggest that use of nominal expansions generally increases with age (O'Donnell, et al., 1967, p. 78; Hunt, 1965, p. 53). Fourth graders in Hunt's study used nominal modifiers about 63% as often as twelfth graders did; eighth graders 83% as often (see O'Donnell, et al., 1967, p. 65). Hunt also investigated number of modifiers attached to a single nominal and found that older students use a larger number of nominals and that these nominals tend to be more complex (pp. 114-15). In terms of position of nominal expansions within a sentence, those used in direct object position were most common and object of preposition second (O'Donnell, et al., 1967, p. 65).

Kretschmer (1972) found that though the adjective transformation was the most common complex transformation produced by both hearing and hearing impaired adolescents, hearing impaired students produced adjective transformations significantly more often than normally hearing children, a trend which was particularly pronounced with younger children (p. 87).

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[11] Unlike Hunt (1965) and O'Donnell, et al. (1967), this investigator included possessive nouns and pronouns as part of the determiner system. (See Streng, 1972, Lessons 20 & 21.)

(2) Infinitives. Four types of infinitives were defined by Streng (1972) in her description of transformation types: (a) infinitive as verb phrase complement (X-V-to-inf.-Y); (b) infinitive as noun phrase complement (X-V-NP-to-inf.-Y); (c) infinitive with "to" omission (X-V-base form-Y; X-V-NP-base form-Y); and (d) infinitive with adjective preceding it (NP-be-adj.-to-inf.-Y). Lee & Canter (1966) in their system for assessing syntactic development in children's oral language assigned a low rating to infinitives as verb phrase complements (X-V-to-inf.-Y). Infinitive types with "to" omissions, with nouns or adjectives preceding them, gerunds, and passive infinitives received higher ratings and thus were considered to be more complex.

(3) Subordinate clause structures. A subordinate clause was defined as a dependent structure containing a finite verb and a subject. Three types of subordinate clauses were identified: noun clause, adjective clause, and adverb clause.

Hunt (1965) found that older students put more subordinate clauses into their T-units and that the most important developmental trend was the increase in use of adjective and noun clauses (pp. 88-9). Adverb clauses showed no statistically significant increase (p. 91). Hunt mentions that fourth graders produced all three types of clauses, though not as frequently as older students. O'Donnell, et al. (1967) found that adverbial clauses were used significantly more often by fifth graders than by third, though there was no significant difference between fifth and seventh graders. Noun

clauses showed no significant gains (p. 62). Relative (adjective) clauses were used less frequently than noun or adverb clauses, though " ... the relative difference in frequency was least marked at the youngest age" (O'Donnell, et al., p. 61).

Kretschmer (1972) noted significant differences between hearing and hearing impaired subjects in the frequency of clause usage, particularly clauses involving a relative pronoun ("that," in particular) and adverb clauses involving time (pp. 82-3).

(4) Coordinate structures. Coordinate structures were defined as transformations involving the joining together of two or more T-units or the combining of subjects, predicates, or modifiers through deletion transformation (Streng, 1972, p. 147).

Coordination of main clauses is common in both the speech and writing of young children (Hunt, 1965, p. 93; Loban, 1963; O'Donnell, et al., 1967, p. 54). Hunt suggests that merely counting number of words in a sentence might give the illusion of sentence maturity unless this coordination of clauses is taken into account (pp. 7-8).

That younger children miss opportunities to coordinate two clauses into one by joining subjects, predicates, modifiers, or other such units through conjunction deletion transformation is demonstrated in Hunt's research. Hunt found that eighth graders use more coordinations within T-units than twelfth graders and concluded that this form has been mastered by the eighth grade (p. 98). O'Donnell, et al. (1967) substantiate Hunt's findings and suggest that " ... maximal use of coordinations within T-units

in writing (probably) develops at about the fifth or sixth grade level" (p. 70). At all grade levels coordinate constructions occurred most frequently in the predicate position, second in nominal, and third in modifier position (p. 70).

In Kretschmer's (1972) study there was little apparent difference between hearing impaired and hearing children in their use of conjunction transformations (p. 87).

Summary of findings on transformational analysis of the T-unit. Literature on transformational analyses of written language suggests that there might be a complexity hierarchy among kernel sentences, simple transformations, and complex transformations. Further, among sentence-combining transformations, number and types of these transformations would appear to affect their complexity, and thus, developmental trends might be noted.

Conclusions

An examination of literature on syntactical studies of written language in older children suggested that language maturity could be examined through a description of T-unit factors. Furthermore, a transformational analysis of sentence types and the expansions occurring within these types provided a structural description of the processes underlying this increasing complexity. It would seem, then, that these measures might be useful in examining the syntax of younger children's spontaneous writing.

Summary of the Review of Literature

Literature on the feasibility of obtaining spontaneous writing from young children suggested to this investigator that under appropriate circumstances it might be possible to obtain spontaneous written productions from preschool, kindergarten, and first grade children and that teaching strategies might have an effect upon their productions.

Literature on oral language development suggested that there appears to be an orderly progression in acquiring one's language and that this learning is rule-based. That developmental stages can be identified led this investigator to speculate that there might be some relationship between oral and written language acquisition and that an examination of these stages might provide a model for analyzing early written productions.

Literature on written language development indicated that an analysis of T-unit factors appeared to be a valid measure of assessing language complexity and that the findings of studies on older children might provide interesting comparisons with a younger population. An examination of transformational linguistic analyses of sentence types and complexities suggested further bases for comparison, as well as ideas for the formation of an analysis system appropriate for the syntactic productions of children in this investigation.

CHAPTER III

PROCEDURES AND METHODS

The purpose of this pilot project was to describe syntactical structures in the written language of a select group of preschool, kindergarten, and first grade children.

Research Method

Spontaneous written language in response to a stimulus picture was obtained weekly from five children each at three grade levels over a ten week period. A case study approach was used to analyze each child's written corpus. Two stages of written language were identified: a presentence stage and a sentence stage. Presentence structures were identified and described after models of oral language acquisition and development. Sentence structures were analyzed and discussed in terms of T-unit factors, using an analysis system adapted from classification systems of Hunt (1965) and O'Donnell, et al. (1967), and in terms of transformational complexity, using a model adapted from Kretschmer (1972).

Subjects

Subjects were five children each at three grade levels: preschool (four and five year olds), kindergarten (five and six year olds), and first grade (six and seven year olds). Eight boys and seven girls comprised the sample. Thirteen of the 15 children attended a private school in Cincinnati, Ohio. The other two children, who attended a public school in Cincinnati, are the

investigator's children. All children were considered by their teachers to be "normal" learners, with the exception of one preschool child, Bob, who showed exceptional reading ability. (See Table 1.)

Test Battery

Prior to collection of written samples, a battery of tests was administered to each child in order to establish background data.[12] Names of the children, ages, and individual results of the test battery are presented in Table 1. The following tests were administered: (1) letter recognition; (2) letter writing; (3) word writing; (4) Fry's Instant Word List; (5) Gray Oral Reading Test; (6) Goodenough-Harris Drawing Test; and (7) Peabody Picture Vocabulary Test.

Administration of the battery of tests was based on several assumptions: (1) that children would have to recognize some letters in order to write; (2) that children would have to be able to write some letters in order to produce words on paper; (3) that children would have to be able to write some words in order to respond in writing to a stimulus picture; (4) that reading ability would have some effect on ability to produce written language; and (5) that intelligence might be one factor in the prediction of success at writing.

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[12] Children's names are fictitious.

TABLE 1

INDIVIDUAL SCORES ON WRITING, READING, AND INTELLIGENCE TEST BATTERY

Name	Age	(1)	(2)	(3)	(4) grade	(5) level	(6) standard	(7) scores
Peter	7.2	-	-	3	1.2	1.3	113	137
Pat	7.1	-	-	3	4.8	2.8	109	140+
Alice	7.0	-	-	3	1.6	1.4	113	122
Ed	6.8	-	-	3	1.6	1.7	96	108
Nina	6.7	2	3	3	1.2	1.3	128	110
Mack	6.3	2	2	2	1.1	1.1	101	133
Jean	6.2	-	-	3	2.8	2.0	108	121
Ethel	5.11	2	3	2	1.8	1.8	142	83
Matt	5.11	2	2	3	1.1	1.1	105	121
Tom	5.8	2	3	3	1.1	1.1	114	107
Collin	5.6	2	2	1	-	-	101	139
Don	5.2	1	1	1	-	-	72	85
Bob	5.1	2	2	2	4.8	2.0	83	134
May	5.0	2	2	2	-	-	82	125
Ann	4.7	2	1	0	-	-	90	99

(1) letter recognition: 1 = recognizes some, but less than 20 capital letters; 2 = recognizes 20 or more capital letters and 13 or more small letters
(2) letter writing: 1 = prints 5-15 identifiable letters; 2 = prints 16-24 identifiable letters; 3 = prints 25-26 identifiable letters
(3) word writing: 0 = prints no words spontaneously; 1 = prints one word spontaneously; 2 = prints 2-3 words spontaneously; 3 = prints 4 or more words spontaneously
(4) Fry's Instant Word List: estimated grade level = point at which student missed 5 or more words (20%) on given word list
(5) Gray Oral Reading Test: estimated grade level on oral reading ability
(6) Goodenough-Harris Drawing Test: general intelligence test
(7) Peabody Picture Vocabulary Test: verbal intelligence test

Letter Recognition

Preschool and kindergarten children were asked to identify 3-inch capital letters and 1 1/2 inch small letters. Those students who recognized less than 20 capital letters were given a "1" rating. Those who recognized 20 or more capital letters and over 13 small letters were given a "2" rating.

Letter Writing

Preschool and kindergarten children were asked to write the letters of the alphabet as the experimenter dictated them. A three point rating scale was given to this task: 5-15 identifiable letters = 1; 16-24 identifiable letters = 2; 25-26 identifiable letters = 3. First grade children were not asked to do parts (1) and (2) of the test battery.

Word Writing

All children were asked to "write some words you know." An arbitrary rating of 0-3 was established: 0 = prints no words spontaneously; 1 = prints one word spontaneously; 2 = prints two-three words spontaneously; 3 = prints four or more words spontaneously.

Fry's Instant Word List

Those children who scored 2 or 3 on Test (3) were asked to identify words from Fry's Instant Word List (Fry, 1972). Fry lists words into four groups of 25 words each at the first, second, and third grade reading levels, for a total of 300 words. The fourth grade word list contains 12 groups of 25 words, for a total of 300 words. According to Fry, " ... the learning of the Instant Words

roughly parallels total reading development" (p. 51) and is based on " ... frequency counts of words used in children's reading material and in their speaking and writing" (p. 48). An arbitrary "estimated grade level" was established by this investigator, based on the list at which a student missed five or more (20%+) of the words on a given list.

Gray Oral Reading Test

Those children who scored 2 or 3 on Test (3) were given the Gray Oral Reading Test (Gray, 1963) in order to establish a general reading level.

Goodenough-Harris Drawing Test and Peabody Picture Vocabulary Test

The experimenter administered two intelligence tests in order to establish a general measure of intellectual maturity for each child. Harris (1963) points out that the Goodenough-Harris Drawing Test " ... does not yield a score that is identical with IQ derived from a well-administered individual intelligence test" (p. 246). Some test measures that differ from each other " ... are probably due to differences in patterns of abilities" (p. 247). The PPVT, according to Dunn (1965), does not provide " ... a comprehensive measure of intellectual functioning. Rather, it attempts to provide a useful prediction of school success, particularly in the area of verbal intelligence" (p. 33).

Description of Sample

Based on the data obtained from the test battery, the following observations were made: (1) All children evidenced ability to

recognize and to write some letters; all but one child recognized most letters; all but two children wrote most letters from dictation; (2) all children but one were able to write at least one word spontaneously; (3) four preschool and three kindergarten children were designated as nonreaders at the start of this experiment; one preschool child, two kindergarten children, and all first graders demonstrated some reading ability; (4) standard scores on the Goodenough-Harris Drawing Test ranged from 72-142; scores on the Peabody Picture Vocabulary Test ranged from 83-140; one child exhibited a combined average of below 90; for the other children, combined averages fell within the normal intelligence range; discrepancies between standard scores of the two intelligence tests suggests their limitations as adequate predictors of general intelligence level.

Collection of Data

Written compositions in response to stimulus pictures from the Peabody Language Development Kit (Dunn & Smith, 1965) were elicited weekly over a ten week period from each of 15 students. A total of 10 written responses was obtained from each student.

The experimenter met with each child individually in an area adjacent to one of the classrooms. At the beginning of each session the child was asked to turn on the tape recorder and give his name. He then was shown a picture and asked to "tell a story about the picture." Questions pertaining to the picture were asked by the experimenter in order to elicit maximum oral response. Each child

in the study was shown the same picture. In order to account for possible differences in responses due to picture complexity, four "people" pictures were interspersed with six more complicated "I Wonder" pictures. The "people" pictures showed persons in various job occupations: a mailman; a dentist; a policeman; and a fireman. The "I Wonder" pictures consisted of 28" x 15" scenes: bright eyes peering out of a dark cave entrance; weird tail and boy's leg showing out from behind a tree; family scene; circus scene; street scene; and run-down house with woman peering out from behind curtain.

After the child had talked about the picture, he was asked to "write a story about the picture. If you don't know how to spell a word, just guess." If the child drew a picture instead of writing, the experimenter said, "You have drawn a nice picture about the picture; now can you write something (a story) about the picture?" If the child showed reluctance to write, the experimenter encouraged him with more conversation about the picture and positive reinforcement about his writing ability.[13] Upon completion of the writing task, each child was asked to read what he had written. All children were given as much time as they required to complete the task. In no case did the time for one picture exceed 15 minutes.

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[13] Several children refused to write on occasion and were given help in the form of spelling assists and/or help with writing of letters. All assists are noted in their language corpus descriptions, Figures 4 through 12.

Identification of Terms Used in Analysis of Data

Figure 1 presents a schematic representation of stages identified in the language corpus of preschool, kindergarten, and first grade children in this study. As the schematic representation indicates, two stages of spontaneous written language were identified: a presentence stage, consisting of written "communication units," and a sentence stage, consisting of "T-units."

Presentence Stage

The presentence stage was defined as those written utterances having no identifiable morphemes or involving either portions of a noun phrase (NP) or verb phrase (VP), but not both. Communication units at the presentence stage included unstructured graphemic jargon, structured graphemic jargon, symbols, strings, expansions, and early restricted kernel sentences. (See Figure 2 for samples of these types). These terms were adapted from descriptions of oral language acquisition and early development by Menyuk (1971), Bloom (1970), and Brown (1973).

Graphemic jargon was a term given to letters or scribble having no recognizable words or real word approximations. A real word approximation was defined by this investigator as a letter or group of letters bearing some phoneme-grapheme approximation to one or more real words, by adult standards. For example, "m" and "mn" were credited if the child said they meant "man." It was reasoned that children's early oral utterances often bear only some approximation to real words, yet they are perceived as meaningful words. Graphemic

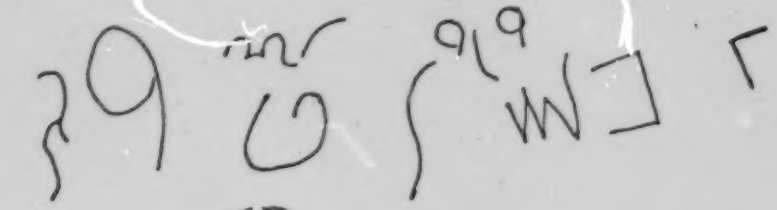
FIGURE 1

SCHEMATIC REPRESENTATION OF STAGES IN THE ACQUISITION AND DEVELOPMENT OF WRITTEN LANGUAGE

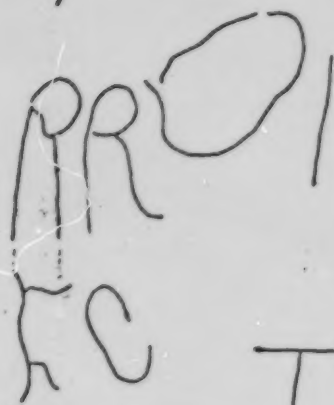
FIGURE 2

SAMPLES OF COMMUNICATION UNITS AT THE PRESENTENCE STAGE

Unstructured Graphemic Jargon

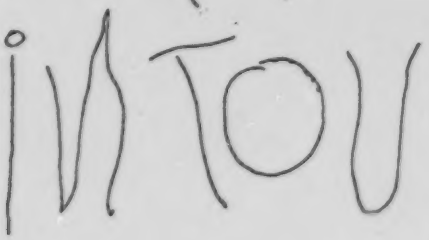


Structured Graphemic Jargon



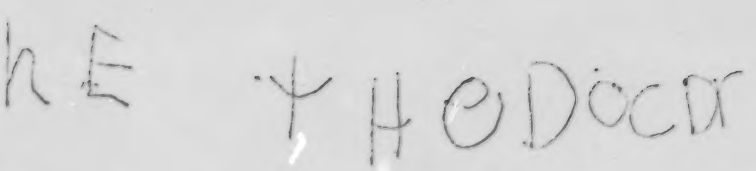
Symbol

String



Expansion

Early Restricted Kernel Sentence



responses differing from the child's reading of them were credited if morphemes were clearly identified. For example, "David," read back by the child as "animal," was credited for the symbol "David," a boy's name. Two types of graphemic jargon were identified: unstructured graphemic jargon, which was defined as jargon having no identifiable morpheme boundaries and might be compared with the babbling stage of oral language acquisition; and structured graphemic jargon, which was defined as jargon having identifiable morpheme boundaries, comparable to the non-lexical, one-word utterances described by Menyuk (1971).

Symbol was a term given to a single real word or real word approximation with or without accompanying jargon. The symbol, as defined by this investigator, was comparable to Menyuk's description of the one-word utterance containing a real word, sometimes accompanied by non-lexical items or long babbled utterances.

String was defined as two or more words appearing together but bearing no apparent syntactical relationship, with or without accompanying jargon. An example would be naming of objects in a picture, such as "doll" + "comic." String was comparable to Bloom's (1970) description of the one-word utterance stage in which the child sometimes recognizes more than one aspect of the reference without appearing to express a syntactical relationship between the two (p. 12). In this investigation the string was considered an interim step between symbol and expansion.

Expansion was defined as two or more syntactically related words, excluding NP+VP relationships, with or without accompanying jargon. An example would be "pretty doll," (adj.+noun). The expansion related to the two- and three-word utterances in oral language acquisition, which, according to Bloom (1970), appear to be systematic and rule-governed (p. 4, 222). Bloom, however, relied on semantic intent to establish syntactic relationships, e.g., the underlying meaning of "mommy-shoe" was dependent on the context in which it was used. As this investigator had only the child's response and the stimulus picture to determine intent, N+N constructions and other ambiguously related units were labelled as strings. Alternative explanations were given in Chapter IV.

Early restricted kernel sentence was defined as two or more syntactically related words, with or without accompanying jargon, expressing or implying a NP+VP relationship but being incomplete (e.g., boy running).

Sentence Stage

The sentence stage was defined as those written utterances involving one or more NP+VP's. Data at the sentence stage was analyzed in terms of T-unit factors, using an analysis system adapted from systems of Hunt (1965) and O'Donnell, et al. (1967) and in terms of transformational complexity, using a concept adapted from Kretschmer (1972) and an examination of basic sentence patterns and transformation types by Streng (1972). Appendix A presents a linguistic analysis worksheet for the sentence stage.

T-unit factors. A T-unit was defined as a main clause plus all of its subordinate clauses. T-unit factors examined in this investigation included average length of clauses, determined by

dividing the total number of words in the language corpus by the total number of clauses:

$$\frac{\text{total number of words}}{\text{total number of clauses}} = \text{average clause length;}$$

the ratio of clauses per T-unit, determined by dividing the total number of subordinate+main clauses by the total number of main clauses:

$$\frac{\text{subordinate+main clauses}}{\text{main clauses}} = \text{ratio of clauses per T-unit;}$$

and average T-unit length, determined by multiplying the above two answers together. T-units shorter than 9 words were also determined.

Complexity factors. T-units were further examined in terms of the types of expansions, alterations, substitutions, deletions, and rearranging of elements occurring within them. Four types of T-units were presented in Figure 1 in a complexity hierarchy, based on an analysis of sentence complexity by Kretschmer (1972): kernel sentences, sentences with kernel sentence expansions; sentences containing simple transformations, and sentences containing complex transformations.

Kernel sentences were defined as basic sentence patterns without expansions and are listed in Appendix A.

Kernel sentence expansions were defined as auxiliary, adverbial, or determiner expansions on the basic sentence pattern and are listed in Appendix A.

Simple transformations were defined as sentences containing alterations within one kernel sentence through the addition, substitution, or movement of elements. Simple transformations included in this study are listed in Appendix A.

Complex transformations were defined as sentences containing the combining of two or more kernel sentences into one T-unit through the substitution, deletion, or rearrangement of elements. A listing of complex transformations is presented in Appendix A.

Treatment of the Data

Spontaneous written language of children in this study was examined (1) by assessing development toward increasing complexity through a description of presentence and sentence stages and a description of T-unit factors and (2) by examining the syntactical structures produced by each child.

Measures of Development toward Increasing Complexity

Analysis of presentence and sentence stages. Each child's language corpus was categorized into communication and/or T-unit types as described in the preceding section. For example, if a T-unit contained one expansion and a simple transformation, it was labelled a simple transformation-type sentence. Total number of responses in each category was determined for each child in the sample. Percentage of each type was determined by grade level.

T-unit factors. Average length of clauses, ratio of clauses per T-unit, and average length of T-units were determined for each child and by grade level for children at the sentence stage. Number

of T-units at varying lengths was determined for each child and percentage was examined by grade level. Percentage of T-units shorter than nine words was computed by grade level.

Analysis of Syntactical Structures

Presentence stage. The written corpus of each child at the presentence stage included: (1) a description of the pre-linguistic structures, form classes, syntactical relationships, and early restricted kernel sentences produced; (2) an examination of graphemic responses in relation to stimulus pictures and child's reading of his response; (3) a comparison of graphemic responses with oral language models.

Sentence stage. Syntactical structures within T-units were described for each child and by grade level. Sentences were examined for types of kernel sentences, kernel sentence expansions, simple transformations, and complex transformations. Descriptions included the following: (1) kernel sentence types produced by each child and percentage of each type by grade level; (2) types of kernel sentence expansions produced by each child and percentage by grade level; (3) types of simple transformations produced by each child and percentage of each type by grade level; (4) types of complex transformations produced by each child and percentage for the entire sample. These included: (a) nominal expansions; (b) infinitives; (c) subordinate clauses; and (d) coordinate structures; (5) types of restricted forms produced by each child in the sample.

CHAPTER IV

RESULTS AND DISCUSSION

The purpose of the present investigation was to describe the syntactical structures in the written language of selected preschool, kindergarten, and first grade children. This investigator first attempted to establish a developmental hierarchy of written language complexity. As no models for written language existed at what this investigator described as the "presentence stage," oral models of language acquisition were used as a reference. At the sentence stage complexity was measured through a description of types of expansions and/or transformations on a kernel sentence base and through an assessment of T-unit factors. In addition to complexity factors, syntactical structures were described for each child and by grade level.

Experimental questions included whether or not there would be development toward greater complexity in children's spontaneous writing and what the nature of this complexity would be, i.e., what linguistic forms and syntactical relationships children at the presentence stage would produce and what phrase structure and transformational rules children at the sentence stage would exhibit in their spontaneous writing.

Measures of Development toward Increasing Complexity

Analysis of presentence and sentence stages. Table 2 presents number and percentage of each type of communication and/or T-unit.

TABLE 2

NUMBER AND PERCENTAGE OF COMMUNICATION UNITS AND/OR T-UNITS CONTAINING GRAPHEMIC JARGON, SYMBOLS, STRINGS, EXPANSIONS, EARLY RESTRICTED KERNEL SENTENCES, KERNEL SENTENCES, KERNEL SENTENCE EXPANSIONS, SIMPLE TRANSFORMATIONS, AND COMPLEX TRANSFORMATIONS BY GRADE LEVEL

PRE-SENTENCE STAGE COMMUNICATION UNITS	PRESCHOOL N	PRESCHOOL %	KINDERGARTEN N	KINDERGARTEN %	FIRST GRADE N	FIRST GRADE %
Graphemic jargon	16	29%	-	-	-	-
Symbols	27	48%	11	19%	-	-
Strings	9	16%	7	12%	-	-
Expansions	2	3.5%	6	10%	-	-
Early restricted kernel sentences	2	3.5%	3	5%	-	-
SENTENCE STAGE T-UNITS						
Kernel sentences	-	-	14	25%	33	26%
Kernel sentence expansions	-	-	11	19%	28	22%
Simple transformations	-	-	3	5%	18	14%
Complex transformations	-	-	2	3%	48	38%
TOTAL NUMBER & PERCENTAGE OF COMMUNICATION UNITS AND/OR T-UNITS	56	99+%	57	98+%	127	99+%

(See Appendix B for raw data on each child.) Based on this small sample, there would appear to be a hierarchy of increasing language complexity, as measured by this kind of analysis. Among five preschool children, all of their 56 communication units appeared in the presentence category. Of these, about half (48%) were symbols. Among five kindergarten children, however, over half of their 57 productions (52%) were T-units. These T-units, moreover, were primarily kernel sentences or kernel sentence expansions. Among five first grade children there were no presentence units. Of their 127 T-units, about half (48%) were kernel sentence types and about half (52%), transformational types.

T-unit factors. Examination of clause-to-T-unit length factors (Table 3) indicates that among the three kindergarten children producing sentence utterances, none of the 30 T-units contained more than one clause. Their average T-unit length, then, was equal to their average clause length, i.e., 4.94 words. Among first graders, all but one child produced at least one T-unit containing a subordinate clause. (See Appendix C for raw data on each child.) The average clause length was almost one word higher than among kindergarten children. However, the addition of the subordinate clause ratio brought overall average T-unit length to almost two words higher (6.71 words for first grade children vs. 4.94 words for kindergarten children). When these results were compared with Hunt's (1965) findings at the fourth, eighth, and twelfth grades

TABLE 3

CLAUSE-TO-T-UNIT FACTORS COMPARED BY GRADE LEVEL WITH HUNT'S (1965) FINDINGS AT GRADES 4, 8, AND 12

Grade	Average Length of Clauses		Ratio of Clauses per T-Unit		Average Length of T-Units
PRESENT STUDY*					
Kindergarten	4.94	x	1.00	=	4.94 words
First Grade	5.64	x	1.19	=	6.71 words
HUNT'S STUDY**					
Fourth Grade	6.60	x	1.30	=	8.60 words
Eighth Grade	8.10	x	1.42	=	11.50 words
Twelfth Grade	8.60	x	1.68	=	14.40 words

* Average length of T-units at the kindergarten level was based on a total of 30 T-units from three children. First grade average was based on a total of 127 T-units from five children.

** Average length of T-units in Hunt's study was based on a 1000 word sample from each of 18 students at each grade level.

(Table 3), clause-to-T-unit factors were seen to increase by grade level.

Examination of percentage of T-units at varying lengths, from three to nine words (Table 4) indicates that first graders produced longer T-units than kindergarten children. At the kindergarten level, of 30 T-units produced by three children, about 1/3 of the T-units were 4-word T-units. About 70% of their T-units were five or less words and there were no T-units of nine or more words. Among the five first grade children, representing 127 T-units, the largest percentage (22%) were 5-word T-units. However, over half of their T-units were more than 5 words in length, and 16.5% of them were over 9 words. (See Appendix D for raw data on each child.) Comparing these results with O'Donnell, et al.'s (1967) study of third, fifth, and seventh grade productions of T-units shorter than nine words (Table 5), percentage of T-units less than nine words would appear to decrease by grade.

Summary of Findings on Measures of Development toward Increasing Complexity

An examination of written language in terms of presentence and sentence stages revealed that there appears to be a hierarchy of increasing language complexity among preschool, kindergarten, and first grade children in this study.

An examination of T-unit length factors in the written production of three kindergarten and five first grade children and comparisons with studies on older children suggested that average length of

TABLE 4

PERCENTAGE OF T-UNITS AT VARYING LENGTHS, FROM THREE TO NINE (PLUS) WORDS BY GRADE LEVEL

Number of Words per T-Unit	Kindergarten. Number of T-Units = 30	First Grade Number of T-Units = 127
2-3	13.3%	5.5%
4	33.3%	18.1%
5	23.3%	22.0%
6	13.3%	15.0%
7	1.0%	13.4%
8	6.7%	9.4%
9+	-	16.5%
TOTAL %	99+%	99+%

TABLE 5

PERCENTAGE OF T-UNITS SHORTER THAN NINE WORDS
COMPARED BY GRADE LEVEL WITH O'DONNELL, ET AL.'S (1967)
FINDINGS AT GRADES 3, 5, AND 7

Grade	Percentage of T-Units Shorter than 9 Words
PRESENT STUDY*	
Kindergarten	100.0%
First Grade	83.5%
O'DONNELL, ET AL.'S STUDY**	
Third Grade	69.7%
Fifth Grade	51.8%
Seventh Grade	47.5%

* Percentage of T-units shorter than nine words was based on a total of 30 T-units from 3 children at the kindergarten level. First grade average was based on a total of 127 T-units from five children.

** Percentage of T-units shorter than nine words in O'Donnell, et al.'s study was based on spontaneous written language in response to two short movie films by 30 children at each grade level.

clauses, ratio of clauses per T-unit, and average T-unit length appear to increase with age and that percentage of T-units less than nine words appears to decrease by grade.

Analysis of Syntactical Structures Produced by Each Child

Following an examination of factors related to the development of language, each child's productions were described as case study reports according to presentence and/or sentence stages.

The written corpus of each preschool and kindergarten child was reproduced in the figure accompanying each child's case study. This description included the name of the stimulus picture, the child's graphemic response to the picture, the child's translation of his graphemic response, the investigator's translation of the graphemic response, and the communication category of the response. Table 6 described the types of jargon and form classes of symbols, strings, expansions, and early restricted kernel sentences produced by each child at the presentence stage. Information drawn from these figures and Table 6 provided the basis for the case study reports on preschool and kindergarten children.

Three kindergarten children and all first graders produced sentence-type structures. At the sentence stage case study information was drawn from Appendices E through L, which described syntactical structures within T-units, as tabulated from the data analysis sheets for each child's T-units. (See Appendix A for a sample of the Linguistic Analysis Worksheet.)

TABLE 6

TYPES OF JARGON AND FORM CLASSES OF SYMBOLS, STRINGS, EXPANSIONS, AND EARLY RESTRICTED KERNEL SENTENCES PRODUCED BY EACH CHILD AT THE PRESENTENCE STAGE

Child Age	Jargon Unstr.	Jargon Struct.	Symbols	Strings	Expansions	Early Restricted Kernel Sentences
PRESCHOOL						
Ann (4.7)	2	1	2 N 1 N+jargon 1 V	1 N+adv. 1 N+N+N+N 2 N+N	-	-
May (5.0)	-	-	9 N	3 N+N	1 adjunct+N	-
Bob (5.1)	-	-	7 N 1 adv.	1 N+N+N+N 1 N+N	1 adjunct+N	-
Don (5.2)	8	2	1 N+jargon		-	-
Collin (5.6)	1	2	1 N 2 N+jargon 2 interjections +jargon	1 prep+prep +jargon		1 jargon+be+ jargon 1 NP+be+jargon
KINDERGARTEN						
Tom (5.8)	-	-	1 N	-	2 det+N	→
Matt (5.11)	-	-	5 N	2 N+N 1 N+N+N	1 N+adj.+N	1 N+(aux omission)+V 1 N+N+V (position restriction)
Ethel (5.11)	-	-	1 N	-	-	→
Mack (6.3)	-	-	4 N	3 N+N 1 N+N+N	1 adjunct+N 1 det+N	1 NP+(verb omission)+NP
Nina (6.7)	-	-	-	-	1 V participle+ det+N	→

The following case studies were examined at the presentence stage: (Preschool) Ann, May, Bob, Don, and Collin; (Kindergarten) Matt and Mack.

The following case studies were examined at both presentence and sentence stages: (Kindergarten) Tom, Ethel, and Nina.

The following cases were examined at the sentence stage: (First grade) Jean, Ed, Alice, Pat, and Peter.

ANN'S WRITTEN LANGUAGE CORPUS: PRESENTENCE STAGE

Age: 4.7; Grade: Preschool

(Refer to Figure 3)

Ann produced two examples of unstructured graphemic jargon, 1 structured graphemic jargon, 4 symbols (1 with jargon), and 4 strings (1 with jargon). Word approximations included symbols containing 3 nouns and 1 verb. Strings included 3 N+N combinations and 1 N+adverb.

An examination of the content of Ann's graphemic responses in relation to her reading of the response and to the stimulus picture indicated that in pictures 1 through 4 Ann's responses related directly to her reading and to picture content. Several of these early responses (e.g., "tongue" in #4 and "scare" in #2) referred to one aspect of the picture to which she responded. From picture 5 on, however, Ann began to produce graphemic jargon and/or responses unrelated to picture content. Her last few attempts (8-10) included producing her name+jargon and one string consisting of colors for crayons she was using and one symbol related to the

FIGURE 3. ANN'S WRITTEN LANGUAGE CORPUS: PRESENTENCE STAGE
Age: 4.7; Grade: Preschool

Stimulus Picture	Graphemic Response	Child's Translation	Investigator's Interpretation	Communication Category
(Pilot) girl holding bird	HA/HA	the first two letters of my name	Hammond/Hammond	string
1 mailman	PL/UP	mailman/up	mailman/up	string
2 eyes peering out of cave	KC	scare	scare	symbol
3 family scene	GGL	girl	girl	symbol
4 doctor & patient	T/K	tongue	tongue	symbol
5 weird tail & boy's leg showing from behind tree	unstructured graphemic jargon	I wrote a dragon's tail and some grass and some letters	unstructured graphemic jargon	jargon (unstructured)
6 woman peering out from behind curtain	structured graphemic jargon	I just don't know what I wrote. Draw. That's all.	structured graphemic jargon	jargon (structured)
7 fireman	unstructured graphemic jargon	a squirter thing to put out fires and then some letters and a number	unstructured graphemic jargon	jargon (unstructured)
8 street scene	PPPPPPPPP/GG/ GGL/B/B	porange/girl/blue	porange/girl/girl/ blue/blue	string
9 circus scene	ANN/unstructured graphemic jargon	I wrote my name and some scribble	Ann/unstructured graphemic jargon	symbol+ jargon
10 dentist & patient	ANN/RRRRRR/Structured graphemic jargon	red and I named my name and I did a circle period	Ann/red/structured graphemic jargon	string+jargon

picture. In these last five pictures, Ann's description of what she wrote matched what she had written. It appeared that Ann could attempt real word approximations, as well as to respond to the picture, but that she gave up trying to attend to the task of eliciting responses related to picture stimuli and instead played with letter combinations and words with which she had some familiarity, e.g., her name and colors.

Comparing Ann's written responses with descriptions of oral language acquisition, Ann's structures were comparable to the early one word utterance level. Her word approximations were a mixture of jargon, symbols, and strings, several of which were accompanied by babbling-type utterances, as in "ppp..." of #8 and "rrr..." of #10. One of her symbols was her own invention ("ppp..." for "porange"), which, according to Menyuk (1971), is common for children at the one word utterance level (p. 95). Several of Ann's single word utterances related to that portion of the stimulus picture which had specific meaning to her. For example, instead of mentioning the obvious characters in the doctor & patient stimulus picture (#4), she wrote the word "tongue." In her three strings she exhibited no apparent syntactical relationships. Rather, her strings contained the beginning of letters of words she apparently was thinking about at the time. Though Ann appeared to have the capacity to produce real word approximations, she opted several times for jargon — playing around with letters and sounds.

One might conclude, then, that Ann was just beginning to acquire

the strategies for putting words on paper and therefore expressed no apparent syntactical relationships in her written language corpus.

MAY'S WRITTEN LANGUAGE CORPUS: PRESENTENCE STAGE

Age: 5.0; Grade: Preschool

(Refer to Figure 4)

May's language corpus included 8 symbols, 3 strings, and 1 expansion. Her symbols and strings were nouns, and her expansion, adjunct+noun.

An examination of May's graphemic responses, her reading of these responses, and their relation to stimulus pictures indicated that May described the pictures in terms of real word approximations, and these descriptions related to the pictures. Generally, she chose the obvious symbol (foreground objects) for her graphemic responses. In samples #2 and #6, however, she chose background objects to describe.

Comparing May's productions with oral language acquisition, her written language was comparable to the one word utterance stage in several respects. She appeared to pull out of pictures the object or objects most meaningful to her. Generally, these reflected picture content or a portion of the picture meaningful to her. Her strings and expansion indicated a co-joining of elements with no apparent syntactical relationship, except for the adjunct+ noun expansion. One string, LION/BILLY (#9), resembled the "mommy-shoe" (subject-object) utterance type of Bloom's (1970) children

FIGURE 4. MAY'S WRITTEN LANGUAGE CORPUS: PRESENTENCE STAGE
Age: 5.0; Grade: Preschool

Stimulus Picture	Graphemic Response	Child's Translation	Investigator's Interpretation	Communication Category
(Pilot) girl holding bird	BE?OD	birdy	birdy	symbol
1 mailman	M?E?	mailman	mailman	symbol
2 eyes peering out of cave	BDR	branch	branch	symbol
3 family scene	MAA	man	man	symbol
4 doctor & patient	DR	doctor	doctor	symbol
5 weird tail & boy's leg showing from behind tree	SAQR/GJI*	star/giant	star/giant	string
6 woman peering out from behind curtain	MIC/SOB	witch/spider web	witch/spider web	string/ expansion
7. fireman	FUF	fire	fire	symbol
8 street scene	BIB	boy	boy	symbol
9 circus scene	LOE/BILLY	lion/Billy	lion/Billy	string
10 dentist & patient	DEFG	dentist	dentist	symbol

*Beginning with picture 5, this investigator wrote letters as child dictated. An exception was "Billy" in number 9, which the child recorded herself.

at the two word utterance stage. In this picture of a lion chasing a boy, May might have tried to describe the subject-object relationship, though this could not be inferred from her graphemic response.

In terms of graphemic development, one might conclude that May produced real word approximations related to picture content and exhibited some signs of being able to express a few syntactical relationships graphemically.

BOB'S WRITTEN LANGUAGE CORPUS: PRESENTENCE STAGE

Age: 5.1; Grade: Preschool

(Refer to Figure 5)

Bob produced 8 noun symbols, 2 N+N strings, and 1 adjunct+Noun. Throughout the duration of this experiment, Bob exhibited frustration with the task.[14] Because of this frustration, occasional spelling assists were given, which are identified in Figure 5.

All of Bob's graphemic responses related to picture content, and he read back exactly what he had written. Almost uniformly, though, his symbols and strings revealed attention to a specific aspect of the picture which had meaning to him, rather than attention to foreground objects. For example, in the simple "people" picture exhibiting a doctor & patient, Bob represented his story about the

[14] In this investigator's opinion, Bob's frustration was due, in part, to his unwillingness or inability to guess at the spelling of words that he read fluently. Smith (1971) discusses the two different processing strategies involved in reading and writing in terms of surface and deep structure, and suggests that writing is the more difficult of the two processes.

FIGURE 5. BOB'S WRITTEN LANGUAGE CORPUS: PRESENTENCE STAGE
Age: 5.1; Grade: Preschool

Stimulus Picture	Graphemic Response	Child's Translation	Investigator's Interpretation	Communication Category
(Pilot) boy reaching for bubble	structured graphemic jargon/CAR*	car	structured graphemic jargon/car	jargon+symbol
1 mailman	LETTERS**	letters	letters	symbol
2 eyes peering out of cave	TAXI***	taxi	taxi	symbol
3 family scene	DOG/FAMLY/COMICS/ DOL**	dog/family/comics/ doll	dog/family/comics/ doll	string
4 doctor & patient	TELESKOP	telescope	telescope	symbol
5 weird tail & boy's leg showing from behind tree	BAT/GIUE	bat/giant	bat/giant	string
6 woman peering out from behind curtain	WEB**	web	web	symbol
7 fireman	FIREMAN**	fireman	fireman	symbol
8 street scene	CAR/WEE	car/wee	car wheel	expansion
9 circus scene	LIO**	lion	lion	symbol
10 dentist & patient	DOWN**	down****	down	symbol

* A car is in the background of this picture. ** Bob received spelling assists on all underlined letters. *** The word "taxi" is not incongruent with the story this child created before writing about the picture. **** The word "down" refers to water pouring from a sink next to the patient.

picture with the word "telescope." For dentist & patient, he chose the symbol "down" for water pouring from the sink next to the patient.

Though Bob was an exceptional reader, as his scores in Table 1 indicate, his written language compared with others in his peer group, in terms of number and types of responses. In relation to oral language models, Bob was at the one word utterance level, where no syntactical relationships are apparent. One exception was the adjunct+noun expansion.

One might conclude, then, that Bob's efforts were geared toward producing picture-related words meaningful to him, rather than attending to syntactical relationships between words.

DON'S WRITTEN LANGUAGE CORPUS: PRESENTENCE STAGE

Age: 5.2; Grade: Preschool

(Refer to Figure 6)

Don produced 10 examples of graphemic jargon, 8 unstructured and 2 structured, and one noun symbol+structured jargon, i.e., his name.

For each stimulus picture Don read back the letters he had written. Each time he was asked what the letters meant, and he responded with words relating to the stimulus picture.

Don's jargon might be compared to the babbling + phonemic jargon and the early one word stages of oral language acquisition. Don produced real letters, comparable to the young child producing

FIGURE 6. DON'S WRITTEN LANGUAGE CORPUS: PRESENTENCE STAGE
Age: 5.2; Grade: Preschool

Stimulus Picture	Graphemic Response	Child's Translation	Investigator's Interpretation	Communication Category
(Pilot) boy reaching for bubble	unstructured graphemic jargon	boy	unstructured graphemic jargon	jargon (unstructured)
1 mailman	unstructured graphemic jargon	a mailman	unstructured graphemic jargon	jargon (unstructured)
2 eyes peering out of cave	DON/IA/RROI	animal	Don/structured graphemic jargon	symbol (+jargon)
3 family scene	unstructured graphemic jargon	mother	unstructured graphemic jargon	jargon (unstructured)
4 doctor & patient	unstructured graphemic jargon	doctor	unstructured graphemic jargon	jargon (unstructured)
5 weird tail & boy's leg showing from behind tree	IA/RRK	tree	structured graphemic jargon	jargon (structured)
6 woman peering out from behind curtain	unstructured graphemic jargon	man	unstructured graphemic jargon	jargon (unstructured)
7 fireman	BTI/OII/A/LE/LVA/A	fireman	structured graphemic jargon	jargon (structured)
8 street scene	unstructured graphemic jargon	paper	unstructured graphemic jargon	jargon (unstructured)
9 circus scene	unstructured graphemic jargon	lion	unstructured graphemic jargon	jargon (unstructured)
10 dentist & patient	unstructured graphemic jargon	doctor	unstructured graphemic jargon	jargon (unstructured)

sound having marked intonation but unidentifiable morphemes. In addition, he produced nonlexical morphemes (structured jargon), comparable to some of the early nonlexical one word utterances described by Menyuk (1971).

One might conclude that Don appeared to recognize that sounds are made up of letters. Further, he appeared to have some notion of word boundaries and was able to produce one real word, his name. However, his productions were, for the most part, prelanguage structures.

COLLIN'S WRITTEN LANGUAGE CORPUS: PRESENTENCE STAGE

Age: 5.6; Grade: Preschool

(Refer to Figure 7)

Collin produced 3 jargon units (1 unstructured and 2 structured), 5 symbols (4 with jargon), 1 string+jargon, and two restricted kernel sentences containing jargon. His symbols consisted of 3 nouns and 2 interjections. His string contained 2 prepositions accompanied by jargon. Of his two restricted kernel sentences, one contained a real verb, "is," with nonlexical morphemes in the subject-object slots (AOT IS ROT). The other contained one jargon-like utterance, "IMIISIM," which he translated as "I'm ...."

An examination of the relationships among graphemic response, the child's reading of that response, and the stimulus picture indicated that Collin's graphemic responses related to his reading of those responses in six of the stimulus pictures (#'s 1, 2, 4, 9, 10, and Pilot). In two of the cited cases, Collin read back

FIGURE 7. COLLIN'S WRITTEN LANGUAGE CORPUS: PRESENTENCE STAGE
Age: 5.6; Grade: Preschool

Stimulus Picture	Graphemic Response	Child's Translation	Investigator's Interpretation	Communication Category
(Pilot) boy reaching for bubble	BL	bubble	bubble	symbol
1 mailman	AOT/IS/ROT	A-O-T is R-O-T	Aot is Rot	restricted kernel sentence (+jargon)
2 eyes peering out of cave	HIII	Hi! How do you do?	Hi/structured graphemic jargon	symbol (+jargon)
3 family scene	HHCG/TH/COLLIN	Mommy, when was this baby born?	structured graphemic jargon/Collin	symbol (+jargon)
4 doctor & patient	THT/IN/TCU	T-H-T/in/out	structured graphemic jargon/in/out	string (+jargon)
5 weird tail & boy's leg showing from behind tree	HI/RIS/HDSN/NMD	There's never supposed to be any dragons in your yard	Hi/structured graphemic jargon	symbol (+jargon)
6 woman peering out from behind curtain	NSTISMA	I hate to be in this house	unstructured graphemic jargon	jargon (unstructured)
7 fireman	CLLIN/RIOIS	Where was the fire?	structured graphemic jargon	jargon (structured)
8 street scene	HISHI/S/GEF	He broke that window	structured graphemic jargon	jargon (structured)
9 circus scene	HRHI/LII	I must get out of here. The lion has escaped from his cage.	structured graphemic jargon	symbol (+jargon)
10 dentist & patient	IMIISIM	I'm glad I am going to the dentist today.	I'm/unstructured* graphemic jargon	restricted kernel sentence (+jargon)

* "IMIISIM" is credited as a restricted kernel sentence (+jargon). Because the child did not use the letters "IM" elsewhere in his samples and because his translation began with "I'm," it was felt that this was legitimate evidence for speculating that the child attempted to record real words.

exactly what he had written, but his words bore no relationship to the stimulus pictures (#'s 1 & 4). In five examples (#'s 3, 5, 6, 7, & 8) Collin's reading of what he had written bore no relationship to what he had written but related to the stimulus pictures.

A superficial glance at Collin's responses might suggest that his productions contained primarily graphemic jargon. However, an examination of his productions as a written language body and in relation to his reading of the graphemic responses suggested that Collin was producing some real words (e.g., hi, in, out, is, Collin), which he arbitrarily acknowledged, or failed to acknowledge, in his reading of his graphemic output. Furthermore, he appeared to have a notion of morpheme boundaries, as most of his written utterances were structured. Like Ann, after #2, Collin appeared to give up trying to write accurate reproductions of what he wanted to say. Unlike Ann, however, he generally managed to get at least one real word or word approximation into his writing. That only three of his 11 utterances were identified as jargon substantiates this finding. Even the jargon responses appeared to have some familiar letter patterns in them. e.g., CLLIN (#7) resembled his name, "IS" occurred in the middle of jargon (#8), and "HI" appeared five times in the corpus (#'s 2, 5, 8, & 9). It might be argued that to identify "LII" as a symbol for lion (#9) was stretching a point. However, Collin did not use that letter combination elsewhere in the corpus. The fact that he included "lion" in his

reading suggested that he may have tried to produce the word graphemically.

Relating Collin's corpus to oral language models, he appeared to be at the one word stage but gave indication of having the capacity to produce at least some rudimentary syntactical relationships, comparable to the 2-3 word utterances of the oral language models. His strings and symbols were comparable to the real one word utterances accompanied by nonlexical morphemes or babbling. Also, his string and symbols contained words which he apparently had learned. These he used without always identifying their presence in his reading. His restricted kernel sentences indicated a recognition of position markers and word order, which, according to oral language models, are learned as the child begins to acquire syntactical relationships.

One might conclude that Collin's graphemic responses gave evidence of his ability to produce real words, as well as express syntactical relationships. Furthermore, he indicated some recognition of word boundaries. However, limitations in his understanding of phoneme-grapheme correspondences often forced him to express his utterances through the use of prelinguistic structures.

MATT'S WRITTEN LANGUAGE CORPUS: PRESENTENCE STAGE

Age: 5.11; Grade: Kindergarten

(Refer to Figure 8)

Matt's written language corpus consisted of 5 noun symbols, 3 N+N strings, one noun+adjective+noun expansion, and two early

FIGURE 8. MATT'S WRITTEN LANGUAGE CORPUS: PRESENTENCE STAGE
Age: 5.11; Grade: Kindergarten

	Stimulus Picture	Graphemic Response	Child's Translation	Investigator's Interpretation	Communication Category
(Pilot)	boy reaching for bubble	BPO/BOE/SE	bubble/boy/see	bubble/boy/see	kernel sentence (restricted)
1	mailman	MM/MAN	mailman	mailman	symbol
2	eyes peering out of cave	E/D C/CAV	eye/dark/cave	eye/dark/cave	expansion
3	family scene	BIY/DOG/BAB	boy/dog/baby	boy/dog/baby	string
4	doctor & patient	DCD	doctor	doctor	symbol
5	weird tail & boy's leg showing from behind tree	BA/CLF	boy/cliff	boy/cliff	string
6	woman peering out from behind curtain	HNN./WIH.	hand/witch	hand/witch	string*
7	fireman	FR/MNI	fireman	fireman	symbol
8	street scene	BOY/RRIK	boy running	boy running	kernel sentence (restricted)
9	circus scene	BILLY	Billy	Billy	symbol
10	dentist & patient	DHP	doc	doc	symbol

* The hand referred to in this picture probably was suggested by the shadow of a hand in the background. The witch's hand cannot be seen.

restricted kernel sentences, 1 N+(aux omission)+verb and 1 N+N+V (position restriction).

Matt's written descriptions corresponded with his reading of them, and his symbols related to picture content.

Comparing his written language corpus with oral models, Matt appeared to be within the one and two-three word stages. Three of his 11 samples expressed syntactical relationships. His expansion, for example, pulled together elements of the picture: eye -- dark -- cave. Unfortunately, the surface structure of Matt's expansion does not reflect the underlying intention. Relating Matt's response to Bloom's study, Matt might have been expressing subject-object relationships, inferring, for example, that the eyes were peering out of the dark cave. Matt's two kernel sentences expressed subject-verb relationships but with restrictions. In Sample 8 the aux position was omitted. According to models of language development, aux addition occurs after positions are learned (Menyuk, 1971). Contrary to Brown's description of the child's learning of word order as an early acquisition, Matt reversed his subject-verb-object order in the pilot study (BUBBLE/BOY/SEE). However, Matt recorded these words underneath, rather than beside each other and may have been making separate comments about the picture instead of expressing syntactical relationships among the words. On the other hand, he may not have understood that graphemic morphemes appear side by side.

Graphemically, then, Matt showed evidence of ability to produce real words and word approximations, as well as to express some syntactical relationships in his productions. However, the majority (73%) of his productions were nonsyntactical.

MACK'S WRITTEN LANGUAGE CORPUS: PRESENTENCE STAGE

Age: 6.3; Grade: Kindergarten

(Refer to Figure 9)

Mack's language corpus consisted of four noun symbols, four N+N type strings, two expansions (1 adjunct+N; 1 determiner+N), and one restricted kernel sentence (NP+(verb omission)+NP.

Comparison of Mack's graphemic responses with his reading of them indicated that he read back what he had written. His written productions, for the most part, related to objects he picked out from the stimulus pictures. Several of these objects, moreover, were background objects, such as the tie in #4, car and bat in #8, and cloth in #10. It would appear, then, that Mack chose to describe that part of the picture having specific meaning for him.

Relating Mack's productions to oral language models, Mack would appear to be within the one and two-three word utterance level. Three of his communication units contained syntactical relationships, and two of his four strings might be explained as expansions. Because this investigator had only the surface structure of the graphemic response to refer to, Mack's N+N constructions were labelled as strings.

FIGURE 9. MACK'S WRITTEN LANGUAGE CORPUS: PRESENTENCE STAGE
Age: 6.3; Grade: Kindergarten

Stimulus Picture	Graphemic Response	Child's Translation	Investigator's Interpretation	Communication Category
(Pilot) boy reaching for bubble	BOOY/BUBBL	boy/bubble	boy/bubble	string*
1 mailman	U.S./MALI	U.S. mail	U.S. mail	expansion
2 eyes peering out of cave	GROCH	grouch	grouch	symbol
3 family scene	DOG/BOOK'S/DOL	dog/books/doll	dog/books/doll	string
4 doctor & patient	TI/HE/THE/DOCDR	tie/He's the doctor	tie/He the doctor	symbol+ kernel sentence (restricted)
5 weird tail & boy's leg showing from behind tree	BOY	boy	boy	symbol
6 woman peering out from behind curtain	SPITR/COBWEB	spider/cobweb	spider/cobweb	string*
7 fireman	THE/FIRMAN	The fireman	the fireman	expansion
8 street scene	CAR/BAT	car/bat	car/bat	string
9 circus scene	BOY	boy	boy	symbol
10 dentist & patient	CLOTH**	cloth	cloth	symbol

* Alternative explanations are offerred in Mack's case study. ** Cloth refers to the bib worn by the patient.

However, two of Mack's strings, BOY/BUBBLE and SPIDER/COBWEB, might be compared to the subject-object utterances of Bloom's (1970) children. Relevant here also was Mack's restricted kernel sentence (HE THE DOCTOR), which he translated as "He's the doctor."

Graphemically, then, Mack demonstrated ability to produce a variety of symbols and demonstrated a possible understanding of subject-verb-object relationships in his writing, as well as noun phrase elements.

TOM'S WRITTEN LANGUAGE CORPUS: PRESENTENCE & SENTENCE STAGES

Age: 5.8; Grade: Kindergarten

(Refer to Figure 10 and Appendices B-L)

At the presentence stage Tom produced three structures: a noun symbol and two determiner+noun expansions. At the sentence stage Tom produced 8 kernel sentences, 1 kernel sentence expansion, and 1 complex sentence, for a total T-unit corpus of 10 sentences. Tom's kernel sentences contained 5 action verbs and three "be" verbs. He had a total of 3 expansions and/or transformations within his T-units: 1 adverbial phrase expansion; 1 aux expansion, and 1 coordinate nominal in subject position. Average T-unit length was 5.00 words, with a range of 3-7 words. Tom had no restricted forms.

Tom moved from presentence to sentence structures during the 10 week testing period. His early sentences were primarily kernel

FIGURE 10. TOM'S WRITTEN LANGUAGE CORPUS: PRESENTENCE AND SENTENCE STAGES Age: 5.8; Grade: Kindergarten

Stimulus Picture	Graphemic Response	Child's Translation	Investigator's Interpretation	Communication Category
(Pilot) boy reaching for bubble	BOWY	boy	boy	symbol
1 mailman	THE/MAYLMAN	the mailman	the mailman	expansion
2 eyes peering out of cave	THE/MYSTR	the monster	the monster	expansion
3 family scene	THE DAL FAL	The doll fell	The doll fell	kernel sentence
4 doctor & patient	THE GROL ZSN BAD	The girl is in bed	The girl is in bed	kernel sentence
5 weird tail & boy's leg showing from behind tree	THE-DRGAN-ANDTHE-MAN R-FITING*	The dragon and the man are fighting	The dragon and the man are fighting	complex sentence
6 woman peering out from behind curtain	GRATDLA AZIN-THAR*	Dracula is in there	Dracula is in there	kernel sentence
7 fireman	THE FIUR-MAN HZA-ACS	The fireman has a ax	The fireman has a ax	kernel sentence (restricted)
8 street scene	THE BOUY HAT THE WANDOW	The boy hit the window	The boy hit the window	kernel sentence
9 circus scene	TAZ-LIAN-AZ OUT AFHAZ-CAG	? lion is out of his cage	This lion is out of his cage	kernel sentence expansion
10 dentist & patient	THE-MAN HAZ-CAVADS/ THE-MAN-HAZ/ SAMECATMAAT	The man has cavaties. The man has some equipment	The man has cavaties. The man has some equipment.	kernel sentence kernel sentence

* received assists on underlined letters.

sentences. His only modifications on these kernel sentences were two expansions and one complex transformation, indicating that he apparently was attempting to work at accurate production of the basic sentence types.

That early sentences in written language would contain few expansions and/or transformations was discussed in the literature on oral and written language acquisition and development (Chapter Two). Menyuk (1971) suggested that in speech, degree of difficulty is dependent on number of rules and types of operations on sentences being produced. Kretschmer (1972) predicted that hearing impaired youngsters in his study were developmentally behind normal hearing because the handicapped adolescents produced significantly more kernel sentence types. O'Donnell, et al. (1967) suggested that number of sentence-combining transformations was seen to increase with age. It would thus appear feasible that kernel sentences, which require the least number of rules and fewest operations, would appear first in this child's written language corpus.

ETHEL'S WRITTEN LANGUAGE CORPUS: PRESENTENCE & SENTENCE STAGES

Age: 5.11; Grade: Kindergarten

(Refer to Figure 11 and Appendices B-L)

Ethel produced one symbol, six kernel sentences, four kernel sentences with expansions, and one sentence containing a simple transformation, for a total of 11 T-units. Ethel's kernel sentences contained at least one of each of the five kernel sentence types.

FIGURE 11. ETHEL'S WRITTEN LANGUAGE CORPUS: PRESENTENCE AND SENTENCE STAGES Age: 5.11; Grade: Kindergarten

Stimulus Picture	Graphemic Response	Child's Translation	Investigator's Interpretation	Communication Category
(Pilot) girl holding bird	SHE'S HOLDING THE BIRD	She's holding the bird	She's holding the bird	simple transformation
1 mailman	HE IS SALEING LETTERS	He is selling letters	He is selling letters	kernel sentence expansion (restr.)
2 eyes peering out of cave	IT IS A CAVE!	It is a cave.	It is a cave.	kernel sentence
3 family scene	THE BOY IS SAD	The boy is sad	The boy is sad	kernel sentence
4 doctor & patient	THE GILE IS LANING	The girl is laying	The girl is laying	kernel sentence expansion (restr.)
5 weird tail & boy's leg showing from behind tree	THE TREE IS HIEDEN THEM	The tree is hiding them	The tree is hiding them	kernel sentence expansion
6 woman peering out from behind curtain	THE WESH IS PEKEN	The witch is peeking	The witch is peeking	kernel sentence expansion
7 fireman	THIS IS A HAMR	This is a hammer	This is a hammer	kernel sentence
8 street scene	THE WENDOW BROKEND	The window is broken	The window brokened	kernel sentence (restricted)
9 circus scene	HE! HSRIP!!! CLOWN!	He tripped/clown	He trip/clown	kernel sentence (restricted) symbol*
10 dentist & patient	THE WHATR IS ON	The water is on	The water is on	kernel sentence

* Child's semantic intent here is unclear. In the picture it is the boy who trips and the clown is standing aside watching. For this reason, clown was interpreted as a separate symbol.

one had a total of 6 expansions and/or transformations within her T-units, 5 of which were aux, nonmodal expansions, and one of which was a T/contraction transformation. Average T-unit length was 3.91 words, with a range of 2-5 words. Ethel produced 4 morphophonemic restricted forms.

Like Tom, Ethel produced primarily kernel sentence T-units. She demonstrated a command of all five types. Her frequent use of aux expansions indicated ability to expand the verb form in the early sentence stage. Ethel's minimal use of transformations indicated that she was probably attempting to work at production of basic sentence types. Her morphophonemic errors reflected this concern, as well. Brown (1973) and Menyuk (1971) stated that tense and inflectional markers develop after the child has grasped the base structure rules of his language.

NINA'S WRITTEN LANGUAGE CORPUS: PRESENTENCE & SENTENCE STAGES

Age: 6.7; Grade: Kindergarten

(Refer to Figure 12 and Appendices B-L)

Nina produced one presentence structure, a VP+NP expansion. At the sentence stage she produced 1 kernel sentence, 6 kernel sentences with expansions, and 1 sentence containing a complex transformation, for a total of 10 T-units. Six of her 7 kernel sentence types contained action verbs. Nina had a total of 16 expansions and/or transformations within her T-units. Her expansions included 8 nonmodal aux and 4 adverbial expansions,

FIGURE 12. NINA'S WRITTEN LANGUAGE CORPUS: PRESENTENCE AND SENTENCE STAGES Age: 6.7; Grade: Kindergarten

Stimulus Picture	Graphemic Response	Child's Translation	Investigator's Interpretation	Communication Category
(Pilot) girl holding a bird	HDNA RIK	holding a chick	holding a chick	expansion
1 mailman	HE IS WOKIN TO SAIM WON HOOW	He is walking to someone's house	He is walking to someone house	kernel sentence expansion (restricted)
2 eyes peering out of cave	IA WETR THE BEAR SAS IN THE KAV	All winter the bears stayed in their cave	All winter the bear stays in the cave	simple transformation
3 family scene	SHE IS HDN HER HNIS OUT	She is holding her hands out	She is holding her hands out	simple transformation
4 doctor & patient	SHE IS LAIEIN	She is laying	She is laying	kernel sentence expansion (restr.)
5 weird tail & boy's leg showing from behind tree	THE BOE IS PAOBLAE GOIN TO BE EAT	The boy is probably going to be eaten	The boy is probably going to be eat	complex transformation (restricted)
6 woman peering out from behind curtain	THE WOIT IS BO HOIN THE KRTIN	The witch is behind the curtain	The witch is behind the curtain	kernel sentence
7 fireman	THE FIR MAIN IS HLDN A AX	The fireman is holding a ax	The fireman is holding a ax	kernel sentence expansion (restricted)
8 street scene	THE PLIES IS WAOI BOIN THE SRORET	The police is walking down the street	The police is walk down the street	kernel sentence expansion (restricted)
9 circus scene	HE IS HITIN THE LOIE IN	He is hitting the lion	He is hitting the lion	kernel sentence expansion
10 dentist & patient	HE IS LAINI DOWD	He is laying down	He is laying down	kernel sentence expansion (restricted)

three of which were prepositional phrases. Simple transformations included 1 T/particle shift, 1 T/adverb shift, and 1 T/passive. One complex transformation, an infinitive, was produced. Average T-unit length was 5.90 words, with a range of 3-8 words. Three of her four restricted forms were morphophonemic errors. The other error was an article substitution.

Nina produced the most words per T-unit of the three kindergarten children studied at the sentence stage and exceeded the word length of two first grade children. Examination of her language corpus indicated that she produced primarily expanded kernel sentences and that these expansions were primarily nonmodal aux and prepositional phrase expansions. She also demonstrated ability to make simple transformations on her kernel sentences. She showed a definite preference for kernel sentences containing action verbs. Because of her limited use of complex transformations and her morphophonemic errors, one might suggest that Nina was concerned mainly with the production of basic sentences, which she expanded with frequent use of simple verb and adverbial expansions and occasional simple transformations.

JEAN'S WRITTEN LANGUAGE CORPUS: SENTENCE STAGE

Age: 6.2; Grade: First Grade

(Refer to Appendices B-L)

Jean produced 3 kernel sentences, 3 kernel sentences with expansions, and 9 sentences containing complex transformations, for a total of 15 T-units. Five of her six kernel sentence types

contained action verbs. There was a total of 40 expansions and/or transformations within Jean's T-units. These included 5 kernel sentence expansions, 10 simple transformations, and 15 complex transformation types. Kernel sentence expansions included 9 aux and 6 adverbial expansions. Transformations included 5 T/contraction, 2 T/particle separations, 1 T/there, and 2 T/negative. Complex transformations included 3 nominal expansions, 10 subordinate clause structures, and two coordinate constructions. Average clause length was 5.83 words, ratio of clauses per T-unit, 1.60, yielding an average T-unit length of 9.33 words, with a range of 4-17, the highest T-unit length for the group studied. Jean produced one morphophonemic error, a possessive omission.

When compared with findings of Hunt (1965) and O'Donnell, et al. (1967) on older children, Jean's written productions revealed a degree of complexity and sophistication unusual for her age group. Almost half of Jean's T-units were 9 words or longer, whereas in Hunt's study 43% of fourth graders' words were expressed in T-units shorter than 9 words. Ratio of clauses per T-unit in Hunt's study averaged 1.30 at the fourth grade level and 1.68 at the 12th grade. Jean's ratio of clauses per T-unit averaged 1.60, practically that of the 12th grade average. Sixty-seven percent of Jean's T-units were sentences containing complex transformations. Furthermore, 38% of her modifications and expansions on her T-units were complex transformation types. These expansions were primarily subordinate clauses (25%) and aux and adverbial expansions (38%).

That the majority of Jean's clauses were adverbial was not unusual, in light of findings by Hunt (1965) and O'Donnell, et al. (1967) that though children in their study produced all types of clauses, adverbial clauses were more frequent among the younger population.

It would appear that Jean produced most of the structures described in this study. However, she generally produced the "easier" or least complex of the types, e.g., coordinates in nominal position, as opposed to predicate or modifier positions; adjective-HN expansions, rather than prepositional phrase-modifying noun expansions; adverb clauses, rather than noun or adjective clauses. No infinitives or T/indirect objects appeared in Jean's language corpus.

ED'S WRITTEN LANGUAGE CORPUS: SENTENCE STAGE

Age: 6.8; Grade: First Grade

(Refer to Appendices B-L)

Ed produced 11 kernel sentences, 4 kernel sentences containing expansions, 3 sentences containing simple transformations, and 14 sentences containing complex transformations, for a total of 32 T-units. His kernel sentences included 5 "be" verbs and 11 action verbs. Expansions and/or transformations on these 32 T-units were 11 kernel sentence expansions, 9 simple transformations, and 17 complex transformations, for a total of 37 expansions and/or transformations within his 32 T-units. Ten of his 11 kernel sentence expansions were prepositional phrase expansions. Simple transformations

included 2 T/particle separations, 4 T/there, 1 T/passive, and 2 T/adverb shifts. Complex transformations included 2 nominal expansions, 4 infinitives, 6 subordinate clause transformations, and 5 coordinate constructions. Of his clauses, six were adverbial, two adjective, and one noun. Mean clause length was 5.22, ratio of clauses per T-unit, 1.16, yielding an average T-unit length of 6.05, with a range of 3-11 words per T-unit. Restricted forms included 3 morphophonemic errors, one incomplete sentence (an adverb clause), and a particle substitution.

It would appear that Ed was producing about half simple kernel sentence types and about half simple or complex transformation types. Average clause length for Ed was 5.22, the lowest among first graders. However, the fact that he had 6 subordinate clauses brought his average T-unit length to 6.04 words, third among the five first grade children. His expansions and transformations on the base kernel sentence appeared to be well diversified, though he seemed to favor prepositional phrases. His use of all three types of clauses indicated flexibility with these structures. Coordinates occurred in both nominal and predicate position. Infinitives were all the early verb phrase complement type. Like Jean, Ed demonstrated a grasp of the kernel sentence types, as well as ability to use a diversity of transformation types. Unlike the others, his verbs were simple and, for the most part, active.

ALICE'S WRITTEN LANGUAGE CORPUS: SENTENCE STAGE

Age: 7.0; Grade: First Grade

(Refer to Appendices B-L)

Alice produced 5 kernel sentences, 5 sentences containing kernel sentence expansions, 2 simple transformation-type sentences, and 11 sentence-combining transformation-type sentences, for a total of 23 T-units. Of her kernel sentences, Alice produced at least one of each type, which included 6 action verb sentences and 4 "be" verb sentences. Her expansions included 8 aux, 5 adverbials, and 1 determiner. Simple transformations included 4 T/contraction and 5 T/there. Her complex transformations consisted of 7 nominal transformations, 2 infinitives, 6 subordinate clause transformations, and 2 coordinate constructions, for a total of 40 expansions and/or transformations within 23 T-units. Alice coordinated T-units 9 times among these 23 T-units. Mean clause length was 5.81 and ratio of clauses per T-unit, 1.17, yielding an average T-unit length of 6.79 words, second largest among first graders in the study. Range was 4-16 words per T-unit. Alice produced one restricted form, a morphophonemic error.

Like Ed and Jean, over half of Alice's T-units contained simple or complex transformations. These transformations were diversified, though, proportionately, she produced more nominal expansions, subordinate clauses, and aux expansions than other types. Of her nominal constructions, three of the seven were prepositional phrases modifying nouns, which, according to O'Donnell, et al. (1967) occur

less frequently than the adjective-modifying noun type. Four of her five clauses were adverbial clauses, which, according to studies cited appear to occur with greater frequency than noun and adjective clauses in younger writers. Alice's frequent use of coordination between T-units reflected what Hunt (1965) and O'Donnell, et al. (1967) suggest is a common practice among early speaker-writers. Of the five children writing complex sentences, Alice was the only one to join her T-units consistently in this way. One might conclude, then, that Alice's corpus reflected ability to produce the basic kernel sentence types and that she made use of a diversity of transformational types to expand her sentences.

PAT'S WRITTEN LANGUAGE CORPUS: SENTENCE STAGE

Age: 7.1; Grade: First Grade

(Refer to Appendices B-L)

Pat produced 5 kernel sentences, 5 sentences containing kernel sentence expansions, 3 sentences with simple transformations, and 5 sentences containing complex transformations, for a total of 18 T-units. Kernel sentence types included 6 action verbs and 3 "be" verbs. Within her T-units Pat produced 8 aux expansions, 7 adverbial expansions, 3 simple transformations, and 6 complex transformations, for a total of 24 expansions and/or transformations. Among her expansions were 8 nonmodal aux, 2 adverb, and 5 prepositional phrase expansions. Simple transformations included 1 particle separation, 1 T/there, and 1 T/indirect object. Complex transformations included 1 adjective+N expansion, 1 infinitive, 1 relative clause deletion, and 3 coordinate constructions in nominal position. Average clause

length was 5.70. Pat produced no subordinate clauses, so T-unit length was also 5.70. Number of words per T-unit ranged from 4-11. Pat produced no restricted forms in her language corpus.

In terms of sentence length, Pat produced the smallest number of words per T-unit, in comparison with other first graders. Her T-units, generally, were the least complex, in that over half of T-units were basic kernel sentences with or without simple expansions, and complexity within T-units consisted mainly of kernel sentence expansions (63%). Pat used at least one of each of the complex transformation types, thus indicating ability to produce these forms. However, the majority of her productions were simple. That Pat was in a school environment different from the other four first graders might have been a factor in making comparisons between her production and the other children's. That Pat's reading scores averaged a grade higher than other first graders (see Table 1) did not appear to affect amount or complexity of her written productions.

PETER'S WRITTEN LANGUAGE CORPUS: SENTENCE STAGE

Age: 7.2; Grade: First Grade

(Refer to Appendices B-L)

Peter produced 9 kernel sentences, 11 kernel sentences with expansions, 10 simple transformation types, and 9 complex transformation types, for a total of 39 T-units. Kernel sentences included 6 "be" verbs and 15 action verbs. Expansions and/or transformations

on his 39 T-units included 11 aux, 19 adverbial, and 4 determiner expansions. Simple transformations included at least one of each type, with the exception of T/indirect object. Complex transformations consisted of 5 nominal expansions (adj.+N or adjunct+N), 2 infinitives, 2 subordinate clause transformations, and 1 coordinate construction. Total expansions and/or transformations were 60 within 39 T-units. Average clause length was 5.63, ratio of clauses per T-unit, 1.03, yielding an average T-unit length of 5.80, second lowest among the five first graders. Range of T-unit length was 3-9 words. Restricted forms included two morphophonemic errors.

Peter produced approximately half simple-type sentences and half transformation-type. His kernel sentences showed a distinct preference for the action verb (71% of 20 kernel sentence types contained action verbs). Peter appeared to demonstrate a preference for expanding his T-units through the use of aux and adverbial expansions, which made up 57% of his expansions and/or transformations. However, he demonstrated ability to use a diversity of simple and complex transformation types, as almost half (44%) of his expansions were simple and/or complex transformations.

Analysis of Syntactical Structures at the Sentence Stage by Grade Level

At the sentence stage types of kernel sentences, expansions, and transformations were examined by grade level and/or by total number of each type produced to see if any trends might be noted.

Kernel sentences. Table 7 shows the percentage of each type of kernel sentence produced by children by grade level. (See Appendix E for raw data on each child.) As this table indicates, kindergarten and first grade children produced more sentences containing action verbs than "be" verbs. Sixty-four percent of kindergarten and 69% of first graders' productions were NP+Vi or NP+Vt+NP sentences. This percentage was not as high as O'Donnell, et al.'s (1967) findings that less than 10% of T-units contained "be" forms in the written language of older children. Examination of this table suggests, further, that children at the kindergarten and first grade levels in this study were able to use all five types of kernel sentence forms.

Types of expansions and/or transformations. Table 8 demonstrates the percentages of expansions and/or transformations produced by each grade level. (See Appendix F for raw data on each child.) Of a total of 26 expansions or transformations produced by the three kindergarten children in this study, 73% were kernel sentence expansions. Among first grade children, out of a total of 201 expansions and/or transformations, 44% were kernel sentence expansions, 23.5 simple transformations, and 33% complex transformations. Thus, first graders demonstrated ability to produce sentences with some complexity, whereas the kindergarten children produced primarily simple kernel sentences with some simple expansions.

Kernel sentence expansions. Of the three types of kernel sentence expansions, kindergarten children appeared to favor the

TABLE 7

PERCENTAGE OF EACH OF FIVE TYPES OF KERNEL SENTENCES BY GRADE LEVEL

Kernel Sentence Type	Kindergarten N = 25	First Grade N = 62
NP+be+NP	8.0%	9.7%
NP+be+adv.	20.0%	8.1%
NP+be+adj.	8.0%	12.9%
NP+Vi+(adv.)	32.0%	30.7%
NP+Vt+NP	32.0%	38.7%
TOTAL	99+%	99+%

TABLE 8

PERCENTAGE OF TYPES OF EXPANSIONS AND TRANSFORMATIONS BY GRADE LEVEL

TYPE OF EXPANSION AND/OR TRANSFORMATION	KINDERGARTEN N = 26	FIRST GRADE N = 201
Kernel Sentence Expansions		
Aux expansions	53.8%	17.9%
Adverbial expansions	19.2%	23.4%
Determiner expansions	-	3.0%
TOTAL %	73.0%	44.3%
Simple Transformations		
T/contraction	3.8%	5.0%
T/particle separation	3.8%	3.5%
T/there	-	9.0%
T/indirect object	-	.5%
T/passive	3.8%	2.0%
T/negative	-	2.0%
T/adverb shift	7.7%	1.5%
TOTAL %	19.1%	23.5%
Complex Transformations		
Nominal Expansions	-	9.0%
Infinitives	3.8%	4.5%
Subordinate Clauses	-	12.4%
Coordinate Constructions	3.8%	6.5%
TOTAL %	7.6%	32.9%

aux over the adverbial by 53.8% to 19.2% (Table 8). First graders used both aux and adverbial expansions about equally. Determiner expansions were infrequent. (See Appendices G & H.)

Simple transformations. Among simple transformations, the T/there was the most frequently used among first graders (Table 8). All simple transformations examined in this study were used at least once by kindergarten and first grade children. T/indirect object was the least frequently used. (See Appendix G.)

Complex transformations. The only complex transformations to be used by kindergarten children were infinitives and coordinate constructions (Table 8). Among first graders, all four types were used. (See Appendices I through L for raw data on each child.)

a. Nominal expansions. Of the 18 nominal expansions produced, adjective+N was the most common (67%) (See Table 9). Nominal expansions occurred in all positions but were most frequent in subject position (39%).

b. Subordinate clauses. Of the 20 subordinate clauses produced by children in this study, adverbial clauses occurred the most frequently (65%) (See Table 10). This finding was in accord with Hunt (1965) and O'Donnell, et al.'s (1967) findings. The fact that all three types of clauses occurred suggests that some first graders are capable of producing all three clause structures.

c. Infinitives. Of the 9 infinitives produced, 70% were of the X+V+to+infinitive+Y type, the simplest of the three infinitive forms discussed (See Table 11). However, again, all three types were produced at least once among the first graders studied.

TABLE 9

PERCENTAGE OF NOMINAL EXPANSIONS OF EACH TYPE AND THEIR POSITION IN THE T-UNIT

Types of Nominal Expansions	Percentage Produced N = 18
N+N	16.7%
adj.+N	66.7%
N+prep. phrase	16.7%
TOTAL %	99+%
Positions of Nominal Expansions	
subject	38.9%
object	27.8%
indirect object	—
object of prep.	22.2%
complement	11.1%
TOTAL %	99+%

TABLE 10

PERCENTAGE OF EACH TYPE OF SUBORDINATE CLAUSE PRODUCED BY CHILDREN USING COMPLEX TRANSFORMATIONS

Type of Subordinate Clause	Percentage Produced Total Clauses = 20
Noun Clause (N = 3)	15%
Adjective Clause (N = 4)	20%
Adverbial Clause (N = 13)	65%
Total %	99+%

TABLE 11

PERCENTAGE OF EACH TYPE OF INFINITIVE PRODUCED BY CHILDREN USING COMPLEX TRANSFORMATIONS

Type of Infinitive		Percentage Produced Total Infinitives = 10
verb phrase complement X+V+to+inf.+Y	(N = 7)	70%
noun phrase complement X+V+NP+to+inf.+Y	(N = 2)	20%
"to" omission	(N = 1)	10%
	Total %	99+%

d. Coordinate structures. Among the 14 coordinate structures produced by kindergarten and first grade children, nominals were most frequently produced (67%), and these nominals were primarily in subject position (See Table 12). However, again, at least one of each type of nominal was produced in all but indirect object position.

Restricted forms. Restricted forms (See Figure 13) were primarily morphophonemic. As this type of error was produced by both kindergarten and first grade children and constituted their major source of error within T-units, it would appear that tense and number are late acquisitions in written language. This finding corresponds with descriptions of oral language acquisition, where tense and number markers are said to be acquired after the learning of base structure rules.

SUMMARY

The experimental questions asked in Chapter I were re-examined in light of the results and discussion in this chapter.

Will there be development toward greater complexity in the syntax of preschool, kindergarten, and first grade children's spontaneous writing? If so, how can this development be described?

(a) Will categorization of spontaneous writing into developmental stages, adapted from existing descriptions of oral and written language acquisition and development reveal development toward greater complexity?

Findings of this project suggested that a categorization of written language into sentence and presentence stages revealed development toward greater complexity in the spontaneous written

TABLE 12

PERCENTAGE OF EACH TYPE OF COORDINATE CONSTRUCTION WITHIN T-UNITS PRODUCED BY CHILDREN USING COMPLEX TRANSFORMATIONS

Coordinate Constructions within T-units		Percentage Produced Total Constructions = 14
Modifiers	(N = 1)	7.1%
Nominals	(N = 9)	64.3%
Predicates	(N = 4)	28.6%
	Total %	99+%

FIGURE 13

RESTRICTED FORMS PRODUCED BY EACH CHILD
AT THE SENTENCE STAGE

T-Unit with Restricted Form	Description of Error	Classification of Error
Ethel		
The window brokened	aux omission & -ed substitution	morphophonemic
he trip	verb form omission	morphophonemic
He is saleing letters	verb form substitution	morphophonemic
The girl is laying	verb form substitution	morphophonemic
Nina		
...someone house	possessive omission	morphophonemic
The police is walk	verb form omission subject-verb agreement	morphophonemic kernel sentence level
The boy is probably going to be eat	verb form omission	morphophonemic
Joanne		
... dentist seat	possessive omission	morphophonemic
Ed		
...because he deliver letter	subject-verb agreement	complex transformation level
	noun plural omission	morphophonemic
When she got in the door.	incomplete sentence	complex transformation level
There were bats and ghost	noun plural omission	morphophonemic
He made the fire out	particle substitution	simple transformation level
Alice		
It is really spook and dark	adjective form omission	morphophonemic
Peter		
... dentist office	possessive omission	morphophonemic
He is going to get a tooth pull	verb form omission	morphophonemic

language of the 17 children in these case studies. At the presentence stage developmental stages described included unstructured graphemic jargon, structured graphemic jargon, symbol, string, expansion, and early restricted kernel sentence. At the sentence stage developmental stages included kernel sentences, kernel sentences with expansions, sentences containing simple transformations, and sentences containing complex transformations. The spontaneous written language of selected preschool, kindergarten, and first grade children was described according to one or more of these categories. An analysis of percentage of productions of each type revealed development toward greater complexity by grade level.

(b) Will an assessment of T-unit factors, as described by Hunt (1965) and O'Donnell, et al. (1967) reveal development toward greater complexity?

At the sentence stage development toward greater complexity was revealed by an examination of mean clause length, number of subordinate clauses per T-unit, and mean T-unit length, all of which were found to increase between kindergarten and first grade children in this study and when compared with older children in Hunt and O'Donnell's studies.

What does a transformational linguistic analysis of children's spontaneous writing at the acquisition and early development stages tell us about their ability to express syntactical relationships in their writing?

(a) What linguistic forms do children using presentence structures exhibit in their spontaneous writing?

Preschool and kindergarten children in this study produced several presentence structures, which were identified as (a) unstructured graphemic jargon; (b) structured graphemic jargon; (c) symbols; (d) strings; (e) expansions; and (f) early restricted kernel sentences. These structures varied from nonlinguistic utterances (jargon types) to presentence utterances expressing simple syntactical relationships (expansions and early restricted kernel sentences). Most common among the linguistic forms at the presentence stage were the noun symbols and noun strings, neither of which expressed observable syntactical relationships.

(b) What syntactical relationships do children using presentence structures exhibit in their spontaneous writing?

Syntactical relationships at the presentence stage were primarily determiner+noun or adjunct+noun expansions. However, an examination of semantic intent in several strings and early restricted kernel sentences indicated that underlying relationships might have been expressed that were not revealed in the graphemic representations. However, generally, children appeared to produce either primarily symbols and strings or sentences.

(c) What phrase structure rules do children at the sentence stage exhibit in their spontaneous writing?

Kindergarten and first grade children who wrote sentences produced all five types of kernel sentences accurately, thus exhibiting a basic understanding of phrase structure rules in their written language. Action verbs were favored by both groups. Kindergarten children demonstrated ability to expand their kernel sentences through the use of aux expansions and adverbials, which made up 73% of their

expansions and/or transformations. First graders demonstrated ability to move beyond kernel sentence expansions to producing more complex sentences, as only 44% of their expansions and/or transformations were simple kernel sentence expansion types.

(d) What transformational rules do children at the sentence stage exhibit in their spontaneous writing?

Kindergarten children exhibited limited ability to use transformational rules. Only 8% of their 58 communication and/or T-units contained simple or complex transformations. First graders exhibited ability to use a variety of transformational rules. Fifty-eight percent of their 127 T-units contained simple or complex transformations. All of the simple transformation types described were used at least once by first graders. Most common was T/there. Least used was T/indirect object. Among complex transformations, most common were subordinate clauses, though these children as a group demonstrated ability to use a variety of complex transformations in their written language.

CHAPTER V

CONCLUSIONS AND IMPLICATIONS

The principal findings of this study were summarized below.

(1) Some parallels appear to exist between the acquisition and early development of oral language and the acquisition and early development of written language.

An examination of written presentence structures indicated that some children produced graphemic jargon comparable to the babbling and phonemic jargon stages in oral language acquisition. Single words, comparable to the one word utterance stage (Menyuk, 1971), in which some nonlexical iterms, some word approximations, and some real words, often accompanied by jargon, were also produced. Few syntactical relationships were expressed in the early two and three word structures in written language. However, some two and three word structures were clearly syntactically related and others, judging from semantic intent, may have been comparable to the subject-object type utterances in Bloom's study (1970).

At the sentence stage early written sentences revealed further comparisons with studies of oral language development. Phrase structure rules appear to be acquired first, as kindergarten children produced primarily kernel sentence types. Few transformations, particularly complex transformations, were produced by kindergarten children. However, frequent expansions on the phrase structure took the form of auxiliary and adverbial expansions. According to oral models of language development, position and order rules come first.

Ability to extend the base structure depends, in part, on the number of rules needed to derive the structures, the types of operations needed, and the selectional restrictions on these structures (Menyuk, 1971, p. 159). Furthermore, errors at the sentence stage were primarily morphophonemic, corresponding with findings in oral language acquisition that tense and number restrictions are learned after the base foundation is laid. It would appear that children at the sentence stage in this study had learned or were in the process of learning the phrase structure rules but had not completed their understanding of tense and number restrictions in their sentences.

(2) Preschool, kindergarten, and first grade children in this study exhibited ability to produce linguistic forms and to express syntactical relationships.

Five preschool children produced 29% jargon, 48% symbols, 16% strings, 3.5% expansions, and 3.5% early restricted kernel sentences. That over 70% of their written utterances were real words or word approximations indicated that these preschool children had some notions of written language and that a few were able to express simple syntactical relationships in their writing.

Five kindergarten children in this study produced no graphemic jargon, about half (46%) symbols, strings, expansions, and early restricted kernel sentences, and about half (52%) sentence structures. Syntactical relationships were clearly evident, then, in the writing of several kindergarten children, and all appeared able to produce real words or real word approximations.

First grade children in this study produced no precentence forms, indicating that their concept of a sentence in written language

appeared to be quite clear. Furthermore, their language revealed ability to produce a variety of sentence types, as well as a number and variety of sentence-combining transformations.

(3) There would appear to be development toward increasing complexity in the emerging spontaneous written language of the preschool, kindergarten, and first grade children in this study. Preschoolers produced entirely presentence structures, kindergarten children 46% presentence structures, and first grade children no presentence structures. T-unit length at the sentence stage increased from 4.94 words at kindergarten level to 6.71 at first grade. Hunt's findings at fourth grade indicated a mean T-unit length of 8.6 words. Further development toward increasing complexity was seen in an examination of sentence types and number and types of transformations and/or expansions within these T-units. Kindergarten children produced primarily kernel sentence types, first graders, about half kernel sentences and half transformation types. Among transformations produced, though all types discussed were produced at least once by children in this study, certain expansions and/or transformations were favored by kindergarten and first grade children. Kindergarten children expanded their T-units primarily through aux, nonmodal expansions. First grade children made frequent use of aux and adverbial expansions, but among complex transformations, appeared to favor nominal expansions and subordinate clauses. The adverb clause, which Hunt (1965) and O'Donnell, et al. (1967) in their studies of written language in older children suggest is most commonly used among younger children, was most frequently produced

by children in this study. Of the 20 clauses produced, 65% were adverbial clause structures.

(4) The division of written language production into developmental stages according to syntactical complexity appears to be one method by which to describe and assess children's written language development. Further, at the sentence stage, an assessment of T-unit factors and types and number of expansions and/or transformations within T-units were found to be potential indices of written language maturity.

IMPLICATIONS

A precise description of children's emerging spontaneous written language would be a contribution to the field of basic research on communication processes. Descriptions of oral language acquisition and development have appeared in the literature. However, little has been written about the acquisition and early development of writing as a communication process. This investigator attempted to describe the syntax of early written language of prewriting and beginning-writing children in order to ascertain whether or not young children could produce written language spontaneously and what the nature of their language would be. A system for analyzing written syntax was derived from models of oral language acquisition and transformational linguistic analyses of syntax development in older children. Whether or not this system will hold true for large numbers of children from a variety of backgrounds remains to be seen. This study, then, was conceived as

preparatory work for a larger study. With a larger sample, the following questions might be explored:

(a) Will children from a variety of experiential backgrounds go through the developmental stages described in this investigation in their spontaneous written language?

(b) Will complexity of spontaneous written language be affected by the teaching strategies employed with young children? For example, will children from an environment that encourages early spontaneous writing produce more complex language than children from a background that does not encourage writing?

(c) Will differences exist between the spontaneous written language development of normal children and children who deviate from the norm, i.e., learning disability, reading retarded, mentally retarded, hearing impaired? If so, will these differences reveal developmental lags? Differences in types of errors produced?

Results of this investigation also have implications for the teaching of writing. That some children can write before (or simultaneously with) learning to read was suggested by this investigation. These questions might be explored:

(a) When should writing be taught?

(b) How should writing be taught? Should accuracy be de-emphasized and spontaneity encouraged? Should parents and teachers encourage children to develop their own rules for producing written language?

(c) How will an understanding of developmental stages in writing be of assistance to the classroom teacher?

(d) Will early practice in spontaneous writing benefit the child who is learning to read?

Just as the child learns to manipulate and control the syntax of his oral language, he must learn to manipulate and control his written language. This investigation has attempted to provide a preliminary, exploratory study of how this development might occur.

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APPENDIX A

LINGUISTIC ANALYSIS WORKSHEET FOR SENTENCE STAGE

Sample Number ___ T-Unit: _____
Name _____

_____

_____

T-UNIT FACTORS

_____ 1 Number of words per T-unit
_____ 2 T-unit shorter than 9 words
_____ 3 Number of clauses per T-unit
_____ 4 Use of "and" between T-units

KERNEL SENTENCE PATTERNS

_____ 5 NP + be + NP (Nancy is a girl)
_____ 6 NP + be + adv. (Nancy is in the woods)
_____ 7 NP + be + adj. (Nancy is nice)
_____ 8 NP + Vi (Nancy runs)
_____ 9 NP + Vt + NP (Nancy hit me)

KERNEL SENTENCE EXPANSIONS

_____ 10 Number of kernel sentence expansions

Aux expansions

_____ 11 Non-modal
_____ 12 is, was (is living)
_____ 13 has, had (has lived)
_____ 14 perfect progressives (has been living)
_____ 15 Modal
_____ 16 can, could (can walk)
_____ 17 do, did (does walk)
_____ 18 may, might (may walk)
_____ 19 will (will walk)

Adverbial expansions

_____ 20 single adverb (they performed here)
_____ 21 prepositional phrase (they performed at the theater)
(excluding postnominal modifiers and adverb shifts)

Function

_____ 22 location
_____ 23 time
_____ 24 manner
_____ 25 cause
_____ 26 frequency
_____ 27 other; specify: _____

APPENDIX A, continued.

Determiner expansions

____ 28 prearticles & predeterminers (just, only, all)
____ 29 postdeterminers — ordinals, cardinals, comparatives (the "next most" important task)

SIMPLE TRANSFORMATIONS

____ 30 Number of simple transformations

____ 31 T/contraction (I can't)
____ 32 T/particle separation (Give the prize away)
____ 33 T/there (there is the man)
____ 34 T/indirect object (he gave me the ball)
____ 35 T/passive (the food was eaten)
____ 36 T/negative (she will not come)
____ 37 T/adverb shift (quickly she sat down)
____ 38 T/other; specify: _____

COMPLEX (SENTENCE-COMBINING) TRANSFORMATIONS

____ 39 Number of complex transformations

Nominal expansions (excluding relative & noun clauses)
____ 40 N + N (toy box)
____ 41 adj. + N (pretty girl)
____ 42 N + prepositional phrase (boy in the blue coat)
____ 43 other; specify: _____

Position

____ 44 subject
____ 45 object
____ 46 indirect object
____ 47 object of preposition
____ 48 complement
____ 49 other; specify: _____

Infinitives

____ 50 verb phrase complement (X+V+to+inf.+Y)
____ 51 noun phrase complement (X+V+NP+to+inf.+Y)
____ 52 "to" omission (X+V+base form+Y; X+V+NP+base form+Y)
____ 53 adjective preceding infinitive (NP+be+adj.+to+inf.+Y)

APPENDIX A, continued

Subordinate Clauses

____ 54 noun clause
Position
____ 55 subject
____ 56 object
____ 57 indirect object
____ 58 object of preposition
____ 59 complement

____ 60 adjective clause
Position
____ 61 subject
____ 62 object
____ 63 object of preposition
____ 64 indirect object
____ 65 complement

____ 66 adverbial clause
Function
____ 67 time
____ 68 location
____ 69 manner
____ 70 cause
____ 71 frequency
____ 72 other; specify: _____

____ 73 relative pronoun deletion

Coordinate Constructions (within T-units)

____ 74 modifiers
____ 75 adjective
____ 76 adverb
____ 77 nominals
____ 78 predicates

RESTRICTED FORMS

____ 79 Number of restricted forms
____ 80 morphophonemic
____ 81 kernel sentence and/or expansion level
____ 82 simple transformation level
____ 83 complex transformation level

APPENDIX B

NUMBER OF COMMUNICATION UNITS AND/OR T-UNITS CONTAINING GRAPHEMIC JARGON, SYMBOLS, STRINGS, EXPANSIONS, EARLY RESTRICTED KERNEL SENTENCES, KERNEL SENTENCES, KERNEL SENTENCE EXPANSIONS, SIMPLE TRANSFORMATIONS, AND COMPLEX TRANSFORMATIONS PRODUCED BY EACH CHILD

		Presentence Stage — Number of Communication Units					Sentence Stage — Number of T-Units			
Name	Age	Graphemic Jargon	Symbol	String	Expansion	Early Restricted Kernel Sentence	Kernel Sentence	Kernel S. Expansion	Simple Transformation	Complex Transformation
PRESCHOOL										
Ann	4.7	3	4	4	-	-	-	-	-	-
May	5.0	0	9	2	1	-	-	-	-	-
Bob	5.1	0	8	2	1	-	-	-	-	-
Don	5.2	10	1	-	-	-	-	-	-	-
Collin	5.6	3	5	1	-	2	-	-	-	-
KINDERGARTEN										
Tom	5.8	-	1	-	2	-	7	1	-	1
Matt	5.11	-	5	3	1	2	-	-	-	-
Ethel	5.11	-	1	-	-	-	6	4	1	-
Mack	6.3	-	4	4	2	1	-	-	-	-
Nina	6.7	-	-	-	1	-	1	6	2	1
FIRST GRADE										
Jean	6.2	-	-	-	-	-	3	3	-	9
Ed	6.8	-	-	-	-	-	11	4	3	14
Alice	7.0	-	-	-	-	-	5	5	2	11
Pat	7.1	-	-	-	-	-	5	5	3	5
Peter	7.2	-	-	-	-	-	9	11	10	9

APPENDIX C

CLAUSE-TO-T-UNIT LENGTH FACTORS FOR EACH CHILD AND BY GRADE LEVEL AT THE SENTENCE STAGE

Name	Age	Total Number of T-units	Average Length of Clauses*		Ratio of Clauses per T-Unit**		Average Length of T-Units
KINDERGARTEN							
Tom	5.8	9	5.00	x	1.00	=	5.00 words
Ethel	5.11	11	3.91	x	1.00	=	3.91 words
Nina	6.7	10	5.90	x	1.00	=	5.90 words
		KINDERGARTEN TOTALS	4.94	x	1.00	=	4.94 words
FIRST GRADE							
Jean	6.2	15	5.83	x	1.60	=	9.33 words
Ed	6.8	32	5.22	x	1.16	=	6.05 words
Alice	7.0	23	5.81	x	1.17	=	6.79 words
Pat	7.1	18	5.70	x	1.00	=	5.70 words
Peter	7.2	39	5.63	x	1.03	=	5.80 words
		FIRST GRADE TOTALS	5.64	x	1.19	=	6.71 words

* Average length of clauses was determined by dividing the total number of words in the language corpus by the total number of clauses:

$$\frac{\text{total number of words}}{\text{total number of clauses}} = \text{average clause length}$$

** Ratio of clauses per T-unit was determined by dividing the total number of subordinate + main clauses by the total number of main clauses:

$$\frac{\text{subordinate + main clauses}}{\text{main clauses}} = \text{ratio of clauses per T-unit}$$

APPENDIX D

NUMBER OF T-UNITS AT VARYING LENGTHS, FROM THREE TO NINE (PLUS) WORDS FOR EACH CHILD AT THE SENTENCE STAGE

Name	Age	Total # of T-Units	T-Unit Lengths: 2-3 words	4 words	5 words	6 words	7 words	8 words	9 (plus) words
KINDERGARTEN									
Tom	5.8	9	1	2	4	-	2	-	-
Ethel	5.11	11	2	7	2	-	-	-	-
Nina	6.7	10	1	1	1	4	1	2	-
TOTALS		30	4	10	7	4	3	2	0
FIRST GRADE									
Jean	6.2	15	-	1	1	2	2	2	7
Ed	6.8	32	6	2	9	5	1	3	6
Alice	7.0	23	-	5	3	3	7	2	3
Pat	7.1	18	-	4	8	2	-	2	2
Peter	7.2	39	1	11	7	7	7	3	3
TOTALS		127	7	23	28	19	17	12	21

APPENDIX E

NUMBER OF EACH OF FIVE TYPES OF KERNEL SENTENCES
PRODUCED BY EACH CHILD AT THE SENTENCE STAGE

Name	Kernel Sentence Types					Total
	NP+be+NP	NP+be+adv.	NP+be+adj.	NP+Vi+(adv.)	NP+Vt+NP	
KINDERGARTEN						
Tom	-	3	-	1	4	8
Ethel	2	1	2	3	2	10
Nina	-	1	-	4	2	7
TOTALS	2	5	2	8	8	25
FIRST GRADE						
Jean	-	1	-	1	4	6
Ed	1	-	4	6	5	16
Alice	1	1	2	1	5	10
Pat	2	1	-	3	3	9
Peter	2	2	2	8	7	21
TOTALS	6	5	8	19	24	62

APPENDIX F

PERCENTAGE OF KERNEL SENTENCE EXPANSIONS, SIMPLE TRANSFORMATIONS, AND COMPLEX TRANSFORMATIONS PRODUCED BY EACH CHILD

Name	Number of Expansions and/or Transformations	Kernel Sentence Expansions	Simple Transformations	Complex Transformations
KINDERGARTEN				
Tom	N = 3	67%	-	33%
Ethel	N = 6	83%	17%	-
Nina	N = 18	71%	24%	6%
FIRST GRADE				
Jean	N = 40	38%	25%	38%
Ed	N = 37	30%	24%	46%
Alice	N = 40	35%	23%	43%
Pat	N = 24	63%	13%	25%
Peter	N = 60	57%	27%	17%

APPENDIX G. NUMBER OF EACH TYPE OF EXPANSION AND/OR TRANSFORMATION PRODUCED BY EACH CHILD

TYPE OF EXPANSION AND/OR TRANSFORMATION	KINDERGARTEN				FIRST GRADE					
	Tom	Ethel	Nina	TOTAL	Jean	Ed	Alice	Pat	Peter	TOTAL
Kernel Sentence Expansions										
Aux expansions	1	5	8	14	9	-	8	8	11	36
Adverbial expansions	1	-	4	5	6	10	5	7	19	47
Determiner expansions	-	-	-	-	-	1	1	-	4	6
Simple Transformations										
T/contraction	-	1	-	1	5	-	4	-	1	10
T/particle separation	-	-	1	1	2	2	-	1	2	7
T/there	-	-	-	-	1	4	5	1	7	18
T/indirect object	-	-	-	-	-	-	-	1	-	1
T/passive	-	-	1	1	-	1	-	-	3	4
T/negative	-	-	-	-	2	-	-	-	2	4
T/adverb shift	-	-	2	2	-	2	-	-	1	3
Complex Transformations										
Nominal expansions	-	-	-	-	3	2	7	1	5	18
Infinitives	-	-	1	1	-	4	2	1	2	9
Subordinate Clauses	-	-	-	-	10	6	6	1	2	25
Coordinate Constructions	1	-	-	1	2	5	2	3	1	13
TOTAL NUMBER OF EXPANSIONS AND/OR TRANSFORMATIONS	3	6	17	26	40	37	40	24	60	201

APPENDIX H

NUMBER OF EACH TYPE OF KERNEL SENTENCE EXPANSION
PRODUCED BY EACH CHILD

Name	KERNEL SENTENCE EXPANSIONS: Aux Expansions		Adverbial Expansions		Determiner Expansions		Total # of Expansions
	Non-modal	Modal	Adverb	Prepositional Phrase	Predeterminer	Postdeterminer	
KINDERGARTEN							
Tom	1	-	-	1	-	-	2
Ethel	5	-	-	-	-	-	5
Nina	8	-	1	3	-	-	12
TOTAL	14	0	1	4	0	0	19
FIRST GRADE							
Jean	7	2	-	6	-	-	15
Ed	-	-	1	9	-	1	11
Alice	7	1	3	2	-	1	14
Pat	8	-	2	5	-	-	15
Peter	9	2	7	12	-	4	34
TOTAL	31	5	13	34	0	6	89

APPENDIX I

TYPES OF NOMINAL EXPANSIONS AND THEIR POSITIONS
PRODUCED BY EACH CHILD USING COMPLEX TRANSFORMATIONS

Types of Nominal Expansions	Jean	Ed	Alice	Pat	Peter	TOTAL
N+N	1	-	-	-	2	3
adj.+N	2	2	4	1	3	12
N+prep. phrase	-	-	3	-	-	3
TOTALS	3	2	7	1	5	18
Positions of Nominal Expansions						
subject	-	-	4	1	2	7
object	2	1	1	-	1	5
indirect object	-	-	-	-	-	-
object of prep.	1	1	1	-	1	4
complement	-	-	1	-	1	2
TOTALS	3	2	7	1	5	18

APPENDIX J

TYPES OF SUBORDINATE CLAUSE TRANSFORMATIONS AND THEIR POSITIONS/OR FUNCTIONS PRODUCED BY EACH CHILD USING COMPLEX TRANSFORMATIONS

Subordinate Clause and Its Position/or Function	Jean	Ed	Alice	Pat	Peter	TOTALS
Noun Clause						
As subject						
As object	1					
As obj. of prep.	1					
As indirect obj.						
As complement		1				
			Total noun clauses			3
Adjective Clause						
Modifies subject		2	1			
Modifies object						
Modifies obj. of prep.					1	
Modifies indirect obj.						
Modifies complement						
			Total adj. clauses			4
Adverbial Clause						
Time	4	1				
Location						
Manner						
Cause	3	1	4			
Frequency						
Other						
			Total adv. clauses			13
Relative Pronoun Deletions						
	1	1	1	1*	1	
			Total relative pro. deletions			5
TOTAL SUBORDINATE CLAUSE TRANSFORMATIONS						25

*Pat's T-unit contained a deleted clause, which was credited as a relative pronoun deletion.

APPENDIX K

TYPES OF INFINITIVES PRODUCED BY EACH CHILD
USING COMPLEX TRANSFORMATIONS

Type of Infinitive	Nina	Jean	Ed	Alice	Pat	Peter	TOTALS
verb phrase complement X+V+to+inf.+Y	1		4	1		1	7
noun phrase complement X+V+NP+to+ inf.+Y					1	1	2
"to" omission				1			1
						TOTAL NUMBER OF INFINITIVES	10

APPENDIX L

TYPES OF COORDINATE STRUCTURES AND THEIR POSITIONS
PRODUCED BY EACH CHILD USING COMPLEX TRANSFORMATIONS

Coordinate Structures	Tom	Jean	Ed	Alice	Pat	Peter	TOTALS
Use of "and" between T-units			2	9		2	13
Coordinate Constructions within T-units							
Modifiers				1			1
Nominals	1	2	2	1	3		9
Predicates			3			1	4
						TOTAL COORDINATE CONSTRUCTIONS WITHIN T-UNITS	14